UHF FM REPEATER

TKR-850

SERVICE MANUAL

REVISED

KENWOOD

B51-8557-10 (N) 1233

This Service Manual was revised based on the service manual as per parts No. B51-8557-00, in order to include new variants with the following destination codes : K3.



CONTENTS

GENERAL / SYSTEM SET-UP

INTRODUCTION

SCOPE OF THIS MANUAL

This manual is intended for use by experienced technicians familiar with similar types of commercial grade communications equipment. It contains all required service information for the equipment and is current as of this publication date. Changes which may occur after publication are covered by either Service Bulletins or Manual Revisions, which are issued as required.

ORDERING REPLACEMENT PARTS

When ordering replacement parts or equipment information, the full part identification number should be included. This applies to all parts : components, kits, and chassis. If the part number is not known, include the chassis or kit number of which it is a part and a sufficient description of the required component, for proper identification.

PERSONNEL SAFETY

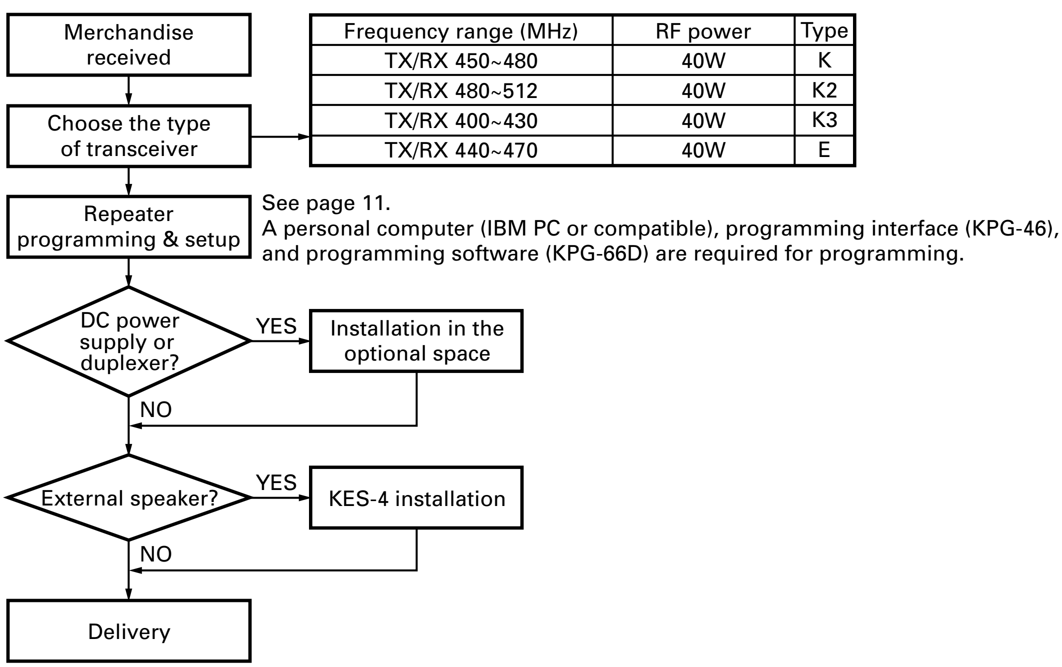
The following precautions are recommended for personnel safety :

- DO NOT transmit until all RF connectors are secure and any open connectors are properly terminated.
- SHUT OFF this equipment when near electrical blasting caps or while in an explosive atmosphere.
- This equipment should be serviced by only qualified technicians.

SERVICE

This radio is designed for easy servicing. Refer to the schematic diagrams, printed circuit board views, and alignment procedures contained in this manual.

SYSTEM SET-UP

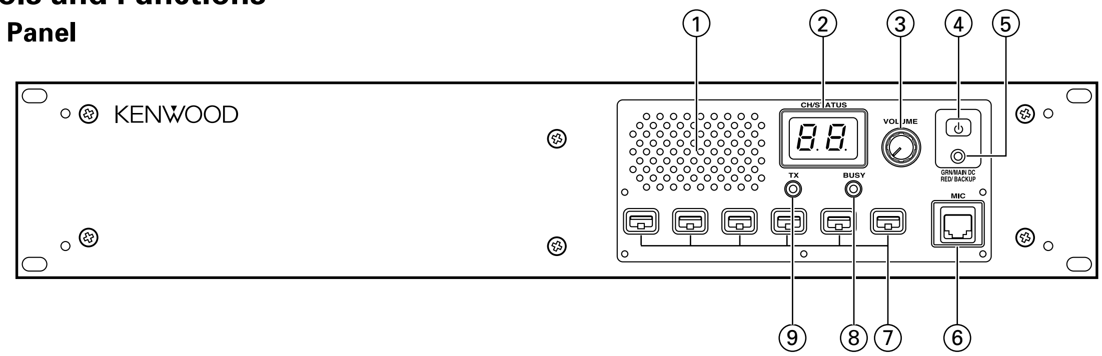


Frequency range (MHz)	RF power	Type
TX/RX 450~480	40W	K
TX/RX 480~512	40W	K2
TX/RX 400~430	40W	K3
TX/RX 440~470	40W	E

OPERATING FEATURES

1. Controls and Functions

1-1. Front Panel



① Speaker

② CH/STATUS Display

Two, 7-segment digits display the channel number or status.

③ VOLUME control

Rotate to adjust the volume.

④ DC source ON/OFF switch

⑤ DC source indicator

Lights green when DC source is applied from the DC 13.6V jack (DC 13.2V jack on E type versions). Lights red when DC source is applied from the BACKUP battery terminal.

⑥ MIC jack

Connect a microphone to this 8-pin modular jack.

⑦ Programmable Function keys

Press these keys to activate their programmable functions.

PF1 key (left side)	Default : None (No function)
PF2 key	Default : Repeat disable/enable
PF3 key	Default : TX disable/enable
PF4 key	Default : Take over
PF5 key	Default : Monitor on/off
PF6 key (right side)	Default : Channel up

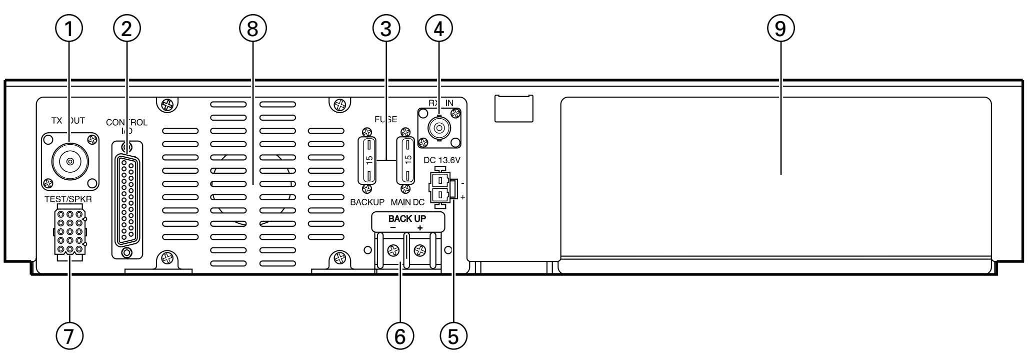
⑧ BUSY indicator

Lights green while a signal is being received.

⑨ TX indicator

Lights red while transmitting.

1-2. Rear Panel



① TX OUT jack

Connect a TX antenna or a duplexer to this receptacle.

② CONTROL I/O jack

Connect an external programming device or repeater controller to this DB-25 interface.

③ FUSE

Insert 15 A blade fuses into these fuse holders.

④ RX IN jack

Connect a RX antenna or a duplexer to this BNC receptacle.

⑤ DC 13.6V (K type) / DC 13.2V (E type) jack

Connect a 13.6 V (K type) or 13.2 V (E type) DC power supply to this jack.

⑥ BACKUP battery terminal

⑦ TEST/SPKR jack

Test input/output jack. Connect an external speaker to this jack.

⑧ Cooling fan

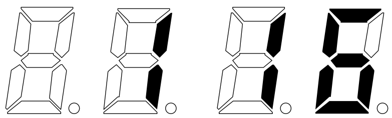
⑨ Optional space

For external DC power supply, or duplexer, etc.

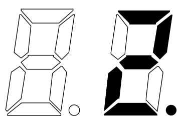
OPERATING FEATURES

2. Two 7-segment LED Displays

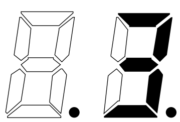
- Channel display (1~16) : While operating normally in user mode.



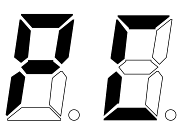
- When the displayed channel is contained in scan sequence, the right side decimal point is displayed.



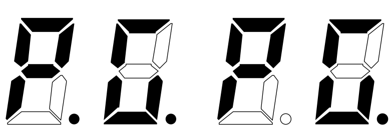
- When the displayed channel is the priority channel, the left side decimal point is displayed.



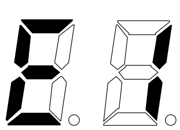
- “PC” is displayed while in PC mode.



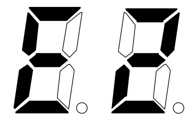
- “PG” is displayed while in firmware programming mode.
  2 decimal points displayed = 115,200bps
  1 decimal point displayed = 57,600bps
  No decimal = 38,400bps



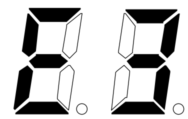
- “E1” is displayed when FPU data is not written.



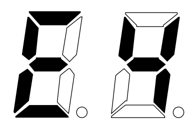
- “E2” is displayed when the channel data is not written.



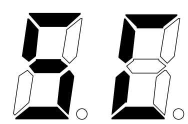
- “E3” is displayed when PLL is unlocked.
  Receiver PLL unlocked = flashing BUSY LED.
  Transmitter PLL unlocked = flashing TX LED.



- “E4” is displayed when PTT is attempted on a channel number that has no frequency data programmed.



- “SC” is displayed while in scan mode.



OPERATING FEATURES

3. Programmable Functions

TKR-850 contains many Programmable Functions tabled below.

Programmable Function	Description
AUX Out 1~5 Off	AUX Out 1 to 5 ports become deactivated, respectively.
AUX I/O 1~6 Off	AUX I/O 1 to 6 ports become deactivated, respectively.
AUX Out 1~5 On	AUX Out 1 to 5 ports become activated, respectively.
AUX I/O 1~6 On	AUX I/O 1 to 6 ports become activated, respectively.
AUX Out 1~5 On/Off	AUX Out 1 to 5 ports are toggled between its active and inactive states, respectively.
AUX I/O 1~6 On/Off	AUX I/O 1 to 6 ports are toggled between its active and inactive states, respectively.
Channel 1~16	Directly select Channel 1 to 16, respectively.
Channel Down	The channel decrements by one.
Channel Up	The channel increments by one.
CW ID On	The CW ID is transmitted.
CW Message 1~8 On	The CW Message 1 to 8 is transmitted, respectively.
Display Off	All panel LEDs are turned off except the Power LED.
Display On	All panel LEDs become active as normal status indicators on the repeater.
Display On/Off	All panel LEDs, with the exception of the Power LED, are toggled between off and their normal status on the repeater.
Hold Time Enable	The Parameter of Repeat Hold Time is enabled.
Hold Time Disable	The Parameter of Repeat Hold Time is disabled.
Hold Time Disable/Enable	The Parameter of Repeat Hold Time is toggled between disabled and enabled.
Local Tx Disable	The local mic's PTT is disabled.
Local Tx Enable	The local mic's PTT is enabled.
Local Tx Disable/Enable	The local mic's PTT is toggled between disabled and enabled.
Monitor Off	The QT/DQT decoder is disabled.
Monitor On	The QT/DQT decoder is enabled.
Monitor On/Off	The QT/DQT decoder is toggled between disabled and enabled.
Monitor Momentary	The QT/DQT decoder is momentarily disabled.
Multi Table Sub	Multi Table No. Select Signalling changes to the Multi Table Sub.
Multi Table Main	Multi Table No. Select Signalling changes to the Multi Table Main.
Multi Table Main/Sub	Multi Table No. Select Signalling changes between Multi Table Sub and Multi Table Main.
QT/DQT Dec Disable	Disables the QT/DQT decode operation.
QT/DQT Dec Enable	Enables the QT/DQT decode operation.
QT/DQT Dec Disable/Enable	Toggles between disabling and enabling the QT/DQT decode operation.
QT/DQT Enc Disable	Disables the QT/DQT encode operation.
QT/DQT Enc Enable	Enables the QT/DQT encode operation.
QT/DQT Enc Disable/Enable	Toggles between disabling and enabling the QT/DQT encode operation.
Repeat Disable	Disables repeater operation.
Repeat Enable	Enables repeater operation.
Repeat Disable/Enable	Toggles between disabling and enabling repeater operation.
Reset	Resets to default condition set up by FPU.
DC Power Save Off	Activates DC Power Save Mode Off.
DC Power Save On	Activates DC Power Save Mode On.
DC Power Save On/Off	Toggles between DC Power Save Mode On and Off.

OPERATING FEATURES

Programmable Function	Description
Scan Off	Inhibits scanning.
Scan On	Starts scanning.
Scan On/Off	Scanning is toggled between being enabled or inhibited.
Scrambler Off	Disables an installed optional voice scrambler board.
Scrambler On	Enables an installed optional voice scrambler board.
Scrambler On/Off	Toggles between enabling and disabling an installed optional voice scrambler board.
Squelch Off	The Squelch unmutes.
Squelch On	The Squelch mutes.
Squelch On/Off	The receiver's squelch toggles between muted and unmuted.
Squelch Momentary	The Squelch momentarily unmutes.
Take Over On/Off	Toggles between disabling and enabling remote wireline control.
Test Tone Off	The Test Tone is inhibited.
Test Tone On	The Test Tone is enabled.
Test Tone On/Off	Toggles between enabling and inhibiting the Test Tone.
TOT Disable	The Time Out Timer is disabled.
TOT Enable	The Time Out Timer is enabled.
TOT Disable/Enable	The Time Out Timer is toggled between disabled and enabled.
TX Disable	The transmitter is inhibited.
TX Enable	The transmitter is enabled (normal).
TX Disable/Enable	Toggles between transmitter inhibited and transmitter enabled (normal).

The following Programmable Functions are output functions used to tell the condition of the TKR-850 to an external device.
The output functions can be assigned to only AUX Outputs as follows.

Programmable Function	Description
COR (Carrier Operate Relay)	This function becomes valid if an RF carrier is present.
TOR (Tone Operate Relay)	This function becomes valid if an RF carrier and the specified QT/DQT are present.
RX Unlock	This alarm function becomes valid if the RX PLL circuitry becomes unlocked.
TX Unlock	This alarm function becomes valid if the TX PLL circuitry become unlocked.
Power Supply Lower Limit	This alarm function becomes valid if the DC power supply voltage becomes less than the preset point. The preset point is selected in the range of 10.6V to 13.6V.
TXS (TX Sense)	This function becomes valid when the transmitter is keyed.
Selectable	AUX Outputs which are set up as Selectable appear in the available Function List for the AUX Input Functions and Key Assignment. This allows AUX Inputs and PF Keys to be used to control AUX Outputs.
RX Signal Detect	This function becomes valid if the RX signal level becomes less than the preset point. The preset point is selected in the range of –120dBm to –95dBm.
RF Power Down Detect	This alarm function becomes valid if the RF Power becomes less than about 10W.
Fan Status	This alarm function becomes valid when the Fan is turned on, either by sensing a high temperature condition or by its operating mode being set to Continuous.

OPERATING FEATURES

4. Trigger Assignment

The Programmable Functions described above can be assigned to PF keys, AUX input, Save on/off, Start up, and Power supply according to following table.

In the last column of the table, when the Programmable Functions is assigned to any PF keys, it expresses that the LED in the PF key turns on either conditions. "Yes" expresses that the trigger is available the Programmable Function. "No" expresses that the trigger is not availabale the Programmable Function.

Trigger / Function	PF keys	AUX input	Save on/off	Start up	Power supply	Condition of LED in he PF key on
AUX Out 1~5 (I/O 1~6) Off	No	Yes	Yes	Yes	Yes	–
AUX Out 1~5 (I/O 1~6) On	No	Yes	Yes	Yes	Yes	–
AUX Out 1~5 (I/O 1~6) On/Off	Yes	Yes	No	No	No	Turns on in ON status.
Channel 1~16, Up/Down	Yes	Yes	Yes	Yes	Yes	Do not turn on.
CW ID On	Yes	Yes	Yes	Yes	Yes	Turns on while transmitting.
CW Message 1~8 On	Yes	Yes	Yes	Yes	Yes	Turns on while transmitting.
Display Off	No	Yes	Yes	Yes	Yes	–
Display On	No	Yes	Yes	Yes	Yes	–
Display On/Off	Yes	Yes	No	No	No	Turns on in ON status.
Hold Time Enable	No	Yes	Yes	Yes	Yes	–
Hold Time Disable	No	Yes	Yes	Yes	Yes	–
Hold Time Disable/Enable	Yes	Yes	No	No	No	Turns on in Disable status.
Local Tx Disable	No	Yes	Yes	Yes	Yes	–
Local Tx Enable	No	Yes	Yes	Yes	Yes	–
Local Tx Disable/Enable	Yes	Yes	No	No	No	Turns on in Disable status.
Monitor Off	No	Yes	Yes	Yes	Yes	–
Monitor On	No	Yes	Yes	Yes	Yes	–
Monitor On/Off	Yes	Yes	No	No	No	Turns on in ON status.
Monitor Momentary	Yes	No	No	No	No	Turns on in ON status.
Multi Table Sub	No	Yes	Yes	Yes	Yes	–
Multi Table Main	No	Yes	Yes	Yes	Yes	–
Multi Table Main/Sub	Yes	Yes	No	No	No	Turns on in Sub status.
QT/DQT Dec Disable	No	Yes	Yes	Yes	Yes	–
QT/DQT Dec Enable	No	Yes	Yes	Yes	Yes	–
QT/DQT Dec Disable/Enable	Yes	Yes	No	No	No	Turns on in Disable status.
QT/DQT Enc Disable	No	Yes	Yes	Yes	Yes	–
QT/DQT Enc Enable	No	Yes	Yes	Yes	Yes	–
QT/DQT Enc Disable/Enable	Yes	Yes	No	No	No	Turns on in Disable status.
Repeat Disable	No	Yes	Yes	Yes	Yes	–
Repeat Enable	No	Yes	Yes	Yes	Yes	–
Repeat Disable/Enable	Yes	Yes	No	No	No	Turns on in Disable status.
Reset	Yes	Yes	No	No	No	Do not turn on.
DC Power Save Off	No	Yes	No	Yes	Yes	–
DC Power Save On	No	Yes	No	Yes	Yes	–
DC Power Save On/Off	Yes	Yes	No	No	No	Do not turn on.
Scan Off	No	Yes	Yes	Yes	Yes	–

OPERATING FEATURES

Function \ Trigger	PF keys	AUX input	Save on/off	Start up	Power supply	Condition of LED in he PF key on
Scan On	No	Yes	Yes	Yes	Yes	–
Scan On/Off	Yes	Yes	No	No	No	Turns on in ON status.
Scrambler Off	No	Yes	Yes	Yes	Yes	–
Scrambler On	No	Yes	Yes	Yes	Yes	–
Scrambler On/Off	Yes	Yes	No	No	No	Turns on in ON status.
Squelch Off	No	Yes	Yes	Yes	Yes	–
Squelch On	No	Yes	Yes	Yes	Yes	–
Squelch On/Off	Yes	Yes	No	No	No	Turns on in OFF status.
Squelch Momentary	Yes	No	No	No	No	Turns on in OFF status.
Take Over On/Off	Yes	No	No	No	No	Turns on in ON status.
Test Tone Off	No	Yes	Yes	Yes	Yes	–
Test Tone On	No	Yes	Yes	Yes	Yes	–
Test Tone On/Off	Yes	Yes	No	No	No	Turns on in ON status.
TOT Disable	No	Yes	Yes	Yes	Yes	–
TOT Enable	No	Yes	Yes	Yes	Yes	–
TOT Disable/Enable	Yes	Yes	No	No	No	Turns on in Disable status.
TX Disable	No	Yes	Yes	Yes	Yes	–
TX Enable	No	Yes	Yes	Yes	Yes	–
TX Disable/Enable	Yes	Yes	No	No	No	Turns on in Disable status.
None	Yes	Yes	Yes	Yes	Yes	Do not turn on.

5. Simplex/Duplex Operation

The Simplex/Duplex function is used to specify whether the channel is used as simplex (receiver muted during transmit) or duplex (receiver unmuted during transmit). If the channel has same TX/RX frequency, it can operate only in Simplex mode.

6. Repeater/Base Station Operation

The Repeat function is used to specify whether the channel is used as a repeater or as a base station. A repeater simultaneously and automatically re-transmits its received audio, a duplex base station has independent simultaneous transmit and receive paths, a simplex base station are mutually exclusive transmit and receive paths.

7. Signalling Feature

7-1. Multiple QT/DQT

The TKR-850 can function as a multiple-QT/DQT decode/encode unit for operation as a community repeater or multiple-QT/DQT base station. Two Multi Tables, called Main and Sub, can be created, each consisting of 16 decode/encode combinations.

The Multi Table function enables the TKR-850 to decode any one of the 16 QT/DQTs pre-programmed into the Multi Table. When receiving a signal (repeater operation), the repeater uses the QT/DQT encode which corresponds to the decoded QT/DQT as set in the Multi Table. In the Multi Table, signalling pair of "No.1" (first column) is defined as "Primary". A receiving signalling (if it is contained within No.1 to No.16) is defined "Current".

From No.2 to No.16, signalling pairs that can be changed between "Main Table" and "Sub Table" using AUX I/O Ports 1-4 are assigned as "Multi Table Select" and the Multi Table Main, the Multi Table Sub or the Multi Table Main/Sub function is executed. When AUX I/O Ports 1~4 are set for "Multi Table Select", these are 4 bit Binary Coded Decimal (BCD) inputs .AUX I/O 1 is a least significant bit (LSB), and "1101" input (LSB on the right side) signifies the Table No.2 and "1100" input signifies the Table No.3.

7-2. Encode Tone in Multiple

When Local Microphone PTT or External PTT is active while the repeater is in use or the duplex-base station is receiving, the encode signalling is determined according to Encode Tone in Multiple function. The simplex-base station always transmits the "Primary" encode QT/DQT.

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Current : When any PTT as described above is active while the repeater is in use or the duplex-base station is receiving, the "paired" encode QT/DQT associated with receiving QT/DQT is transmitted. When any PTT is active while the repeater or the duplex-base station is in idle period, the "Primary" encode QT/DQT is transmitted.

Primary : When any PTT (provided that the Priority of any PTT is higher than the Priority of Repeat PTT) is active while the repeater is in use, the encode QT/DQT changes "paired" encode QT/DQT to "Primary" while continuing to transmit. When any PTT is active while the repeater is in idle period, the "Primary" encode QT/DQT is transmitted. In the base station, the "Primary" encode QT/DQT is always transmitted regardless of the receiver status.

7-3. QT Reverse Burst Time

During repeat with QT tones, the repeater re-transmits a phase-shifted burst of the QT tone ("reverse burst") when it detects the radio using the repeater has un-keyed and also sent a reverse QT burst (squelch-tail elimination). This mutes a receiving radio's speaker audio before its receiver circuit shuts off causing squelch tail noise in the speaker audio. The TKR-850 can select the time between 140 to 200 ms that the QT reverse burst is sent. Typically this time should not have to be adjusted from the default value. The transmission of the QT reverse burst can be also inhibited if the QT Reverse Burst function is set to "No".

7-4. DQT Turn Off Code Time

During repeat with DQT tones, the repeater re-transmits a specific turn-off code when it detects the radio using the repeater has un-keyed and also sent the turn-off code (squelch-tail elimination). This mutes a receiving radio's speaker audio before its receiver circuit shuts off causing squelch tail noise in the speaker audio.

The TKR-850 can select the time between 140 to 200ms that the DQT turn-off code is sent. Typically this time should not have to be adjusted from the default value.

7-5. Off Hook Decode

The TKR-850 is able to decode QT/DQT regardless whether the local microphone is in the on- or off-hook condition. When the Off Hook Decode function is enabled, the TKR-850 is capable of QT/DQT decode even though the microphone is in the off-hook condition (or a local microphone is not installed).

8. Scan Feature

8-1. Scan Operation

Providing that the TKR-850 contains two or more non-priority ADD channel or one or more non-priority ADD channel and Priority channel, it starts scanning once the Scan On function is executed and displays "SC" on the 7-seg LED. Scanning stops temporarily if any following conditions be come valid.

1) if a RF carrier and a valid QT/DQT is present. The receiving channel number is displayed and the received audio is heard from a speaker.
2) if a RF carrier is present, providing that the Monitor On function is executed.
3) if the Squelch Off function is executed. Scanning stops on the channel being scanned when Squelch Off is executed, the channel number is displayed and the received audio is heard from a speaker.
4) if a local microphone's hook is in off hook status, providing that the Off Hook Scan function is set to Disable. Scanning stops on the Revert channel, but the audio is not heard until a valid signal is received.

When the received call is ended, scanning automatically resumes after the period set in Dropout Delay Time function has expired. When the Scan Off function is executed, the TKR-850 inhibits scanning and displays the selected channel.

8-2. Scan Sequence

1) Normal Scan : When no Priority channel is set, scanning of ADD channels is done in ascending order.
2) Single Priority Scan : The Priority channel is set as either a fixed channel or a selected channel. When Priority channel is set, Priority channel and non Priority channel are scanned by turns. When scanning stops on the non Priority channel, calls from the Priority channel are still checked at set intervals while scanning is stopped. This operation is called Look Back and the interval period is selected by the Look Back Time function.

8-3. Revert Channel

The Revert channel is a channel that is used to transmit during scanning. The time from the end of transmission on Revert channel to the time scanning automatically resumes is set in Dwell Time function. The Revert channel types are Last Called, Last Used, Selected, Selected + TalkBack, Priority, and Priority + TalkBack.

1) Last Called : The TKR-850 reverts to the channel upon which a call was last received even if scanning has resumed (power on default = selected channel).
2) Last Used (with TalkBack) : The TKR-850 reverts to the channel that was last transmitted on (power on default = selected channel). However, if a call is received on a channel other than the last transmit channel and PTT is pressed before scanning resumes, the transceiver "talks back" on the current receive channel.
3) Selected : The transceiver reverts to the channel set by the function prior to scan initiation.
4) Selected+TalkBack : The TKR-850 reverts to the channel set by the Channel 'X' functions or Channel Select function prior to scan initiation. However, if a call is received on a channel other than the selected channel and PTT is pressed before scanning resumes, the transceiver "talks back" on the current receive channel.
5) Priority : The TKR-850 always reverts to the Priority channel.

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6) Priority+TalkBack : The TKR-850 always reverts to the Priority channel. However, if a call is received on a channel other than the Priority channel and PTT is pressed before scanning resumes, the transceiver "talks back" on the current receive channel.

9. CW ID and Message

The TKR-850 contains internal automatic station identifiers. The CW ID (Morse code) is set and transmitted on a per-channel basis. The CW ID is transmitted when the interval period is reached (TX Interval Time function), the channel is changed (CW ID on Channel Change function) or CW ID Onfunction is executed. When CW ID is activated by any functions described above, it is actually sent after the total time of TX Delay Time (not applied to CW ID On function) and CW Modulation Delay Time has expired. TX Delay Time is a period from CW ID is activated to the transmitter is keyed.

CW Modulation Delay is a period from the transmitter is keyed to the CW ID tone is sent. The CW ID tone is routed to the Receive Audio (RA) port and a speaker if the Send CW ID to RA function is set to Yes. The TKR-850 contains 8 message banks for CW Message. CW Message 1 to 8 is transmitted on the current channel when the CW Message 1 to 8 On function is activated, respectively.

10. PTT Priority

A number of keying sources can be used to cause the TKR-850 to transmit.

The transmit audio path is switched according to their keying sources and when PTTs is simultaneously activated, the transmit audio path related to the PTT with higher priority is given priority. These are Local Microphone PTT, External PTT, and Repeat PTT.

11. Time Out Timer

The Time Out Timer function determines the period of time users can continuously transmit. When the selected period expires, the transmission is inhibited.

12. Repeat Hold Time

The Repeat Hold Time (hang timer) function is used to prevent the repeater from being repeatedly keyed and unkeyed in response to short message traffic. When a mobile transceiver unkeys, the repeater's Hold Timer allows the repeater to continue transmitting for a brief period while waiting for a responding end user. If no valid QT/DQT is detected within the Hold Timer period, the transmitter is allowed to unkey. This function determines the period of time that the transmitter is allowed to remain keyed after the loss of a valid QT/DQT received signal.

13. Take Over

The Take Over function is used to disable the external wireline control of the repeater. When Take over function is enabled, the external AUX inputs and Outputs, transmit audio inputs and receive audio outputs, External PTT and External Monitor lines are disabled. All AUX Input functions assigned to any AUX Input stay in their current state. However External PTT and External Monitor switch to the "Off" state.

14. Test Tone

The Test Tone is a single-frequency audio sine wave and is turned On and Off by toggling Test Tone On/Off functions. The transmitter can be modulated without a local microphone by using the test tone. When Test Tone On function is executed and any PTT is activated, the TKR-850 transmits the test tone with mic mute and also routes the test tone to RA port.

15. RF Power

The TKR-850 is able to switch transmission output on a per-channel basis. When the TX High Power function is enabled, the transmission output is set to high power.

16. Fan Action

The TKR-850 has a cooling fan. The Fan Action function determines whether the fan is continuously operated or operates in response to high temperatures only.

17. AUX Input and Output

There are 6 programmable AUX I/O Ports 1~6 (pins 20~25) and 3 programmable AUX Input Ports 1~3 (pins 4~6) on the rear 25 pin D-Sub connector (CONTROL I/O) and 5 programmable AUX Output Ports 1~5 (pins 10, 11, 13~15) on the rear 15 pin TEST/SPKR connector.

The 6 programmable AUX I/O pins are primarily intended for remote control interfaces. Each AUX I/O Port can be set for AUX Input, AUX Output, remote Channel Select or Multi Table Select types. The AUX Input Port can be set execute a single input function or a set of up to three functions when the port is activated. If the port type for an AUX I/O Ports 1~6 is set for "AUX Input", it will also appear AUX Input window for function programming. The input logic is fixed as active Low.

The AUX Output Port can be set execute a single output function. If the port type for an AUX I/O Ports 1~6 is set for "AUX Output", it will also appear AUX Output window for function programming. The output logic of AUX Output can be set as either active High or active Low by the Logic Type function. Active High outputs a High (5V) when the programmed condition becomes valid, active Low outputs a Low (0V) when the condition becomes valid.

18. Channel Select

AUX I/O Ports 1~4 (1 or all 4) can each be set for "Channel Select" providing up to 16 channel selection capability. These are 1 to 4 bit Binary Coded Decimal (BCD) inputs. AUX I/O 1 is a least significant bit (LSB). When all of AUX I/O Ports 1~4 set to Channel Select, "1110" input (LSB on the right side) signifies the Channel 1 and "1101" input signifies the Channel 2.When the Channel Select function is set to any AUX I/O ports, the Channel 'X' function (Channel Up, Channel Down, Channel 1, etc.)can not be set to the AUX Input ports, but can be set to the PF Keys. Normally the channel control is controlled by the Channel Select function. If the Take Over function is executed, the channel control is disabled to be controlled by the Channel Select and enabled to be controlled by the PF Keys.

19. DC Power Save

The TKR-850 has the DC Power Save feature. The DC Power Save Mode is activated when the DC Power Save On function is executed. When the DC Power Save Mode is activated, all panel LEDs except the Power LED are turned off, and the audio amplifier and the DSP becomes inactive. When the Display On function is executed while the repeater is in the DC Power Save Mode, all panel LEDs become active as normal status indicators on the repeater, and the audio amplifier and the DSP becomes active. However, when the Save Delay Timer A period expires, all panel LEDs except the Power LED are turned off and the audio amplifier becomes inactive again, and when the Save Delay Timer B period expires, the DSP becomes inactive. When the DC Power Save Mode is turned on or off, up to 3 functions pre-programmed into the Save On function or Save Off function are executed in sequence.

20. Power Supply

The TKR-850 is able to use two Power sources that are called Main and Backup. When the Power source changes from Main to Backup or from Backup to Main, up to 3 functions pre-programmed into the Backup Power function or the Main Power function are executed in sequence.

21. Start Up

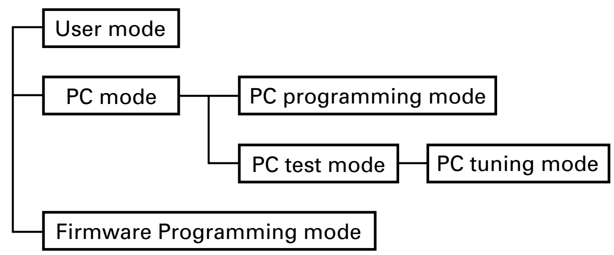
When the TKR-850 is first turned on or is reset, up to 3 functions pre-programmed into the Start Up function are executed in sequence.

22. Optional Board

An optional scrambler board can be installed in the TKR-850. Scrambler codes between 1 and 16 are available per channel. If the scrambler board is not to be used (although it is installed), set the parameter to "Off". When any Scrambler code is set up and the Scrambler On function is executed, the scrambler board is activated.

REALIGNMENT

1. Modes



Mode	Function
User mode	Use this mode for normal operation.
PC mode	Use this mode to make various settings by means of the FPU through the RS-232C port.
PC programming mode	Use to read and write frequency data and other features to and from the repeater.
PC test mode	Use to check the repeater using the PC. This feature is included in the FPU.
Firmware programming mode	Use when changing the firmware program of the flash memory.

2. How to Enter Each Mode

Mode	Operation
User mode	Power on.
PC mode	Received commands from PC.
Firmware Programming mode	[PF1] key + Power on (one second).

3. PC Mode

3-1. Preface

The TKR-850 repeater is programmed by using a personal computer, programming interface and KPG-66D software.

3-2. Connection Procedure

1. Connect the TKR-850 to the personal computer with the interface cable.
2. When power is applied, the user mode is entered immediately. When the PC sends a command, the repeater enters the PC mode and displays "PC" on the 7-segment LED. When data is being transmitted to the PC from the repeater, the TX LED flashes. The BUSY LED flashes when data from the PC is being received by the repeater.

Note :

- The data stored in the personal computer must match the model type, when it is written into the flash memory.
- Change the TKR-850 to PC mode, then attach the interface cable.

REALIGNMENT

3-3. KPG-46 Description (PC Programming Interface Cable : Option)

The KPG-46 is required to interface the TKR-850 to the computer. It has a circuit in its D-sub connector (25-pin) case that converts the RS-232C logic level to the TTL level.

The KPG-46 connects the microphone connector of the TKR-850 to the computer's RS-232C serial port.

3-4. Programming Software Description

The KPG-66D programming disk is supplied in 3-1/2" disk format. The software on the disk allows a user to program TKR-850 repeater via the programming interface cable (KPG-46).

3-5. Programming With IBM PC

Data can be programmed into the flash memory in RS-232C format via the microphone connector.

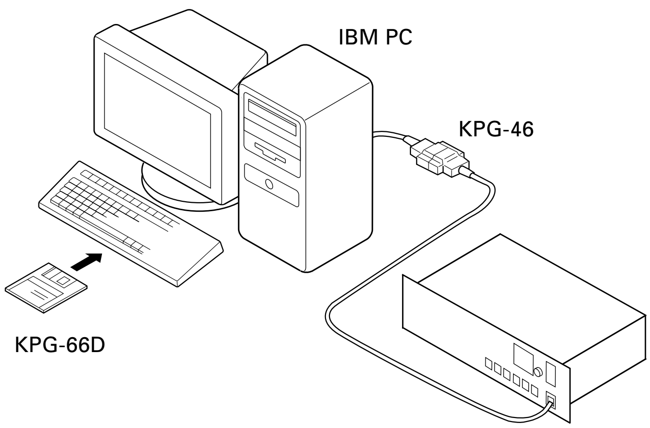


Fig. 1

4. Firmware Programming Mode

4-1. Preface

The TKR-850 uses flash memory to allow it to be easily upgraded when new features are released in the future.

4-2. Connection Procedure

Connect the TKR-850 to the personal computer (IBM PC or compatible) with the interface cable (KPG-46). (Connection is the same as in the PC mode.)

Notes :

You can only program firmware from the 8-pin microphone connector on the front panel. Using the 25-pin logic interface on the rear panel will not work.

4-3. Programming

1. Start up the programming software (Fpro. exe).
2. Set the communications speed (normally, 115200 bps) and communications port in the configuration item.
3. Set the firmware to be updated by file name item.
4. Turn the TKR-850 power on with the [PF1] key held down. Hold the key down for one second until the 7-segment display changes to "P.G.". When "P.G." appears, release your finger from the key.
5. Check the connection between the TKR-850 and the personal computer, and make sure that the TKR-850 is in the program mode.
6. Press write button in the window. A window opens on the display to indicate progress of writing.
7. If writing ends successfully, the TX LED on the TKR-850 lights.
8. If you want to continue programming other TKR-850s, repeat steps 3 to 6.

Notes :

This mode cannot entered if the firmware program mode is set to disable in the programming software (KPG-66D).

4-4. Function

If you press the [PF1] key (front panel), both decimal point on the 7-segment display will disappear. The writing speed is 38400 bps (low-speed mode). If you press the [PF1] key again, the right hand decimal points will light. The writing speed is 57600 bps (middle-speed mode).

Note :

Normally, write in the high-speed mode (115200 bps).

INSTALLATION

1. External Power Supply Connection (Rear Connectors) : See Page 3

This unit has two external power supply connectors : Main DC and Backup.

If an external DC power supply is connected to the main DC connector and a backup battery is connected to the Backup connector at the same time, the DC power supply switches to the battery automatically if power failure occurs. Therefore, the operation of the repeater can be continued.

If the battery is used, but both the battery and power supply need not be connected (if an external switch is used or if only a solar battery is used), connect it to the Backup connector, not the Main DC connector. Current consumption can be reduced by approx. 120mA because the relay is not used.

If it is installed when the temperature at the repeater site is below freezing, check whether the switch (relay) works properly after installation.

2. Voice Scrambler

It operates only during base operation. The voice is not scrambled when it is repeated.

2-1. Modification

1) Remove R742 and R653 on the TX-RX unit (B/2) : control section.

2-2. Connection

1) The functions of pins of CN601 on the TX-RX unit (B/2) : control section are shown in the figure.
2) Join the CN601 connector to the voice scrambler board via the E37-0808-05 connector cable.

When the operation is checked in PC test mode after the modification, and the maximum deviation is adjusted, the voice from the local microphone is not modulated. In this case, remove the CN601 12-pin (PTO) cable and connect it to the land of the display unit (X54-333) from the voice scrambler. The voice from the local microphone can be modulated in PC test mode.

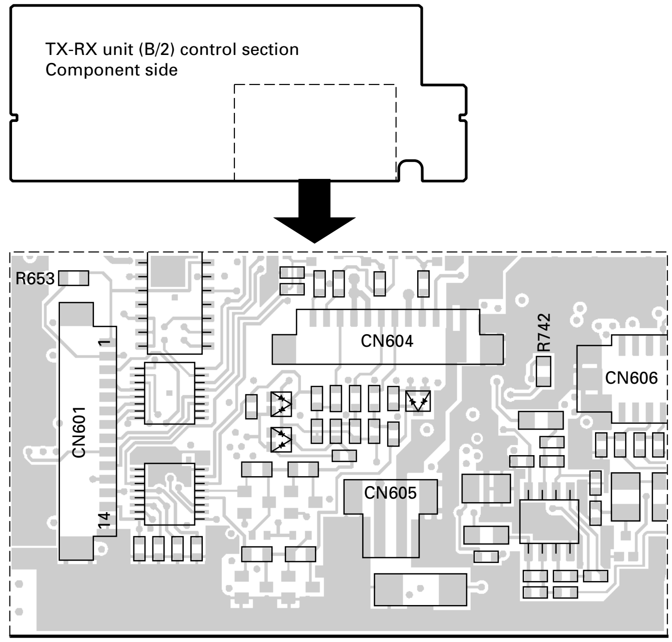


Fig. 1

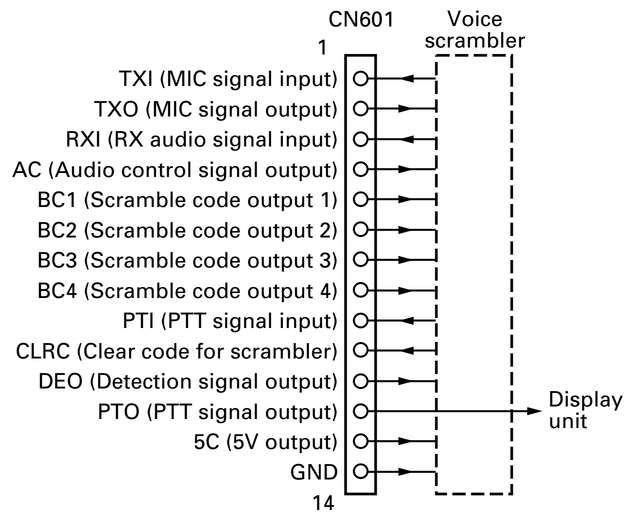


Fig. 2

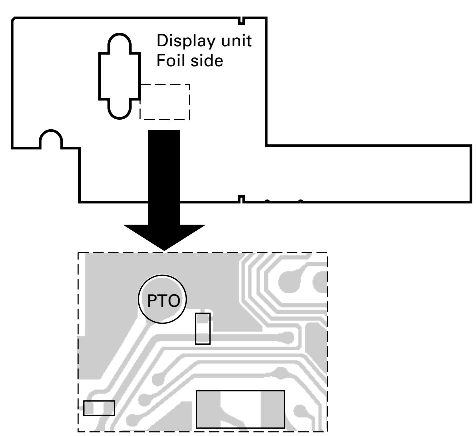


Fig. 3

INSTALLATION

3. External Speaker (KES-4)

The TKR-850 has a internal built-in speaker (5W/8Ω), and the external speaker output from the TEST/SPKR connector (15-pin) on the rear of the radio is 4W/4Ω. Use external speaker KES-4.

3-1. Connection for the KES-4 With the TKR-850

■ **When taking the AF output from the TEST/ SPKR connector (15-pin) on the rear of the radio**

The following tools are required for changing the connector.

- **Extracting tool**
  The following extracting tool is recommended :
  Molex Inc. Order No. : 11-03-0002

1. Remove the connector with jumper from the external speaker connector on the rear panel of the radio. (Fig. 4-1)
   Note : Save the jumper, which is required when the radio is used without the external speaker.
2. Remove the terminals with the jumper from the connector housing holes number 9 and 12 using the extracting tool.
   Removing the jumper lead (Fig. 4-2)
   1) Insert the extracting tool (11-03-0002) into the connector while pushing the jumper lead in the direction of (a).
   2) Push the extracting tool into collapse the barbs of the crimp terminal.
   3) Pull out the lead while continuing to push the extracting tool in the direction (b).
3. Reinsert the terminal with the black and white stripe lead into hole number 12, and the terminal with the black lead into hole number 6. (Fig. 4-3)
4. Attach the connector to the external speaker connector on the radio.

Note :

Relationship between TEST/SPKR connector (15-pin) connection and speaker output.

When pins 9 and 12 are shorted : Built-in internal speaker is used.

When pins 9 and 12 are open and output is from pins 6 and 12 : KES-4 is used.

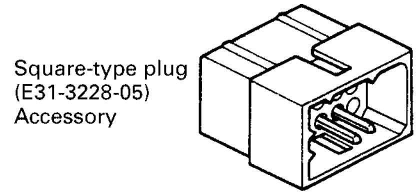


Fig. 4-1

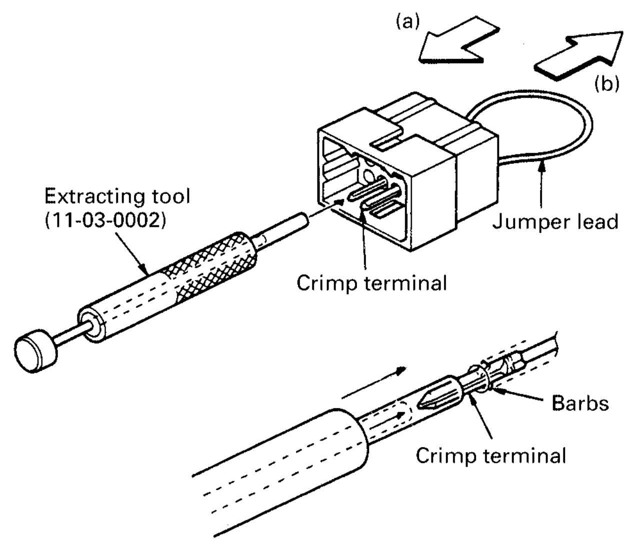


Fig. 4-2

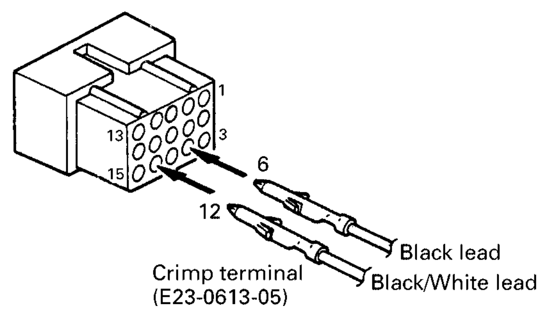


Fig. 4-3

MODIFICATION

1. Modification for Sinking the Collector Current Up

Auxiliary output 1 and 2 can each be modified to sink up 600mA of the collector current. The following modification should be installed when Auxiliary output 1 or 2 is used to control external equipment.

1. Remove D625, R755, and R769 for Auxiliary output 1 (D624, R756, and R770 for Auxiliary output 2) on the component side of the control section for TX-RX unit PCB.
2. Install $Q608, $Q612, and $R761 for Auxiliary output 1 ($Q607, $Q611, and $R759 for Auxiliary output 2) on the component side of the control section for TX-RX unit PCB.
   $Q607, $Q608, $Q611, $Q612 : DTD114EKA
   $R759, $R761 : 3.9kΩ (RK73GB1J392J) chip resistor.
3. Change R801 for Auxiliary output 1 (R797 for Auxiliary output 2) from 1kΩ (RK73GB1J102J) to 0Ω (R92-1252-05).

By making this modification, Auxiliary output 1 and 2 can now sink up to 600mA each.

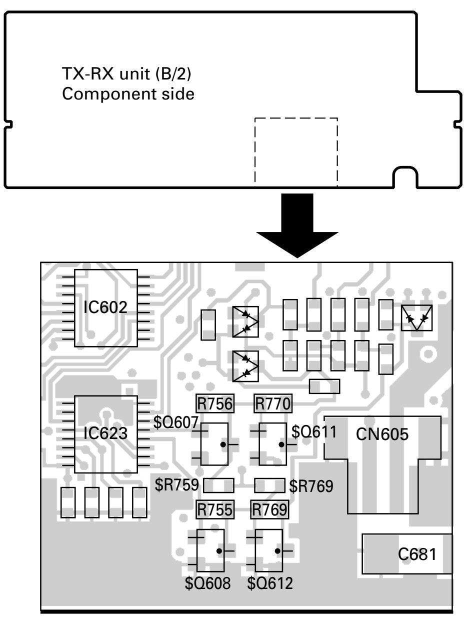


Fig. 1

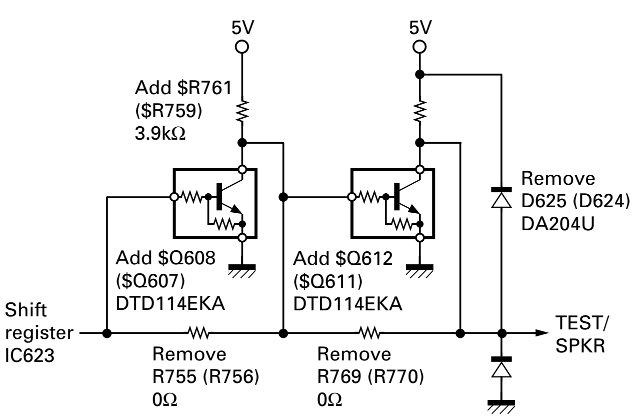


Fig. 2

2. DC Source Switch

To prevent the power supply from turning off due to misoperation of the DC source switch on the front panel or accidents (tampering) after installation, the main unit can be kept on regardless of the on/off of the DC source switch on the front panel.

Short the PSW land near K1 relay by soldering.

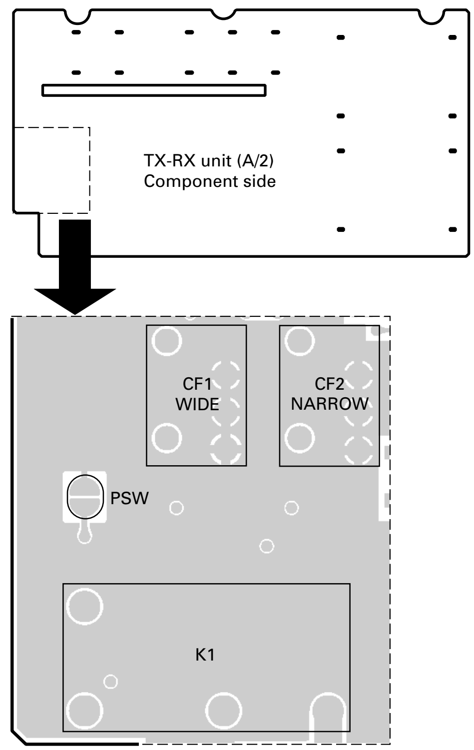


Fig. 3

MODIFICATION

3. Trickle Charge for Backup Battery

If the external DC power supply is connected to the Main DC connector and a backup battery (12V rechargeable type) is connected to the Backup connector at the same time, the battery can be trickle-charged from the external DC power supply with a maximum current of 0.5A.

Short the CHARGE land near R61.

Notes :

1. Make this modification after removing the DC power supply and battery for safety.
2. When the DC power supply is connected after the modification, DC voltage is output to the Backup connector. Be careful during setup.
3. When the backup battery is used for a long time, remove the battery from the repeater and recharge it because the trickle charge is not sufficient for recharging a completely discharged battery.

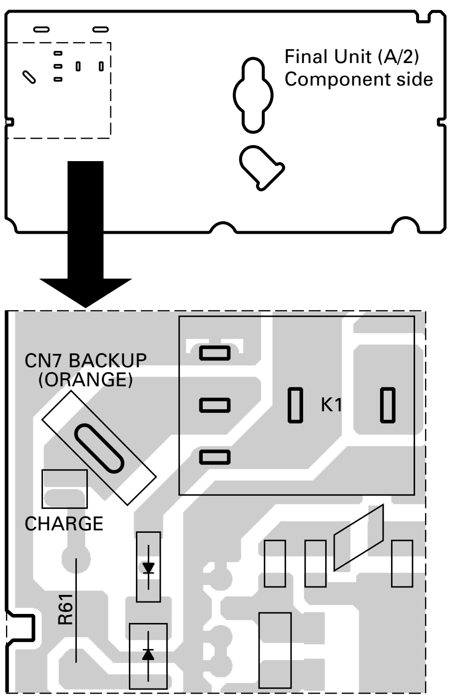


Fig. 4

4. Accessory Cabinet

You can install optional accessories, such as a DC power supply or duplexers in the accessory cabinet.

1. Place the optional accessory in the cabinet as shown below.
2. If necessary, attach cushions (G13-1801-04 and/or G13-1802-04) to the top plate (J21-8402-04) in order to adjust the space between the cabinet and the top plate. Then, insert the 3 tabs of the plate into the slots in the side of the cabinet. High, middle, or low positions are available. To afix the plate, inset and tighten 2 screws on the other side of the plate.

You can also flip the top plate upside-down to adjust a height of the cabinet space.

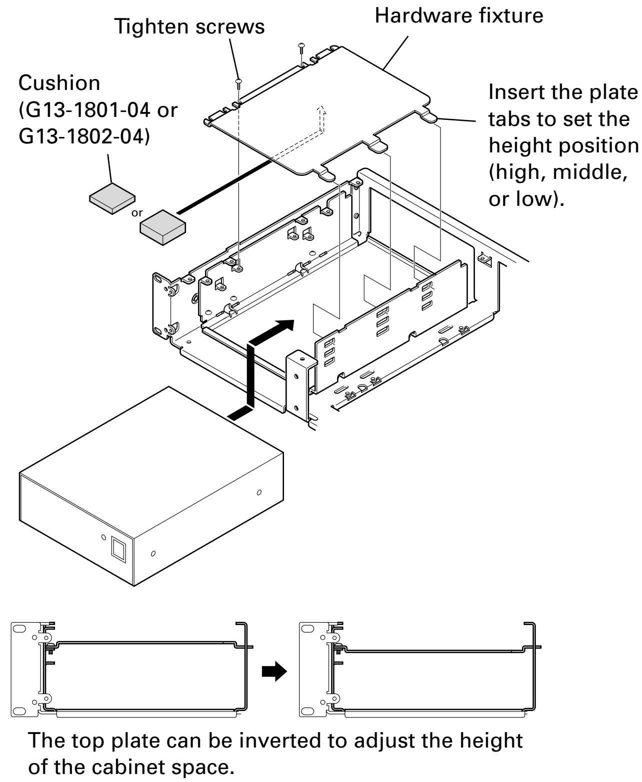


Fig. 5

5. Key Cover

To avoid accidentally pressing the keys, you can install the key cover.

1. Install and fix the key protector using the 5 supplied screws (N35-3006-46).

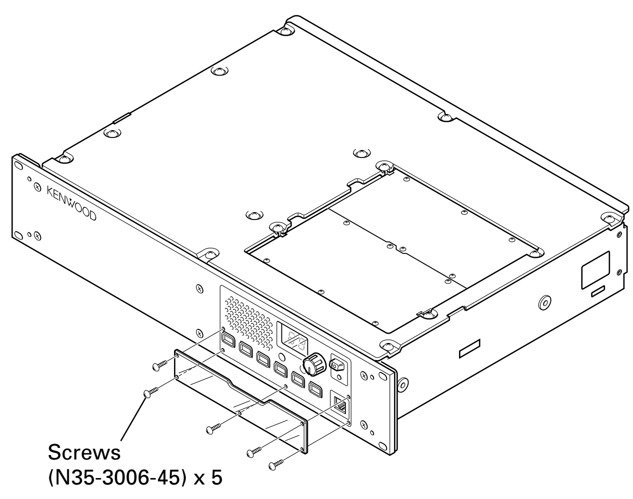


Fig. 6

MODIFICATION / DISASSEMBLY FOR REPAIR

6. Desktop Repeater

When you use the repeater on the desktop, attach the 4 spacers to the base of the repeater as shown in figure. With these spacers attached, the front panel will not touch the desk surface.

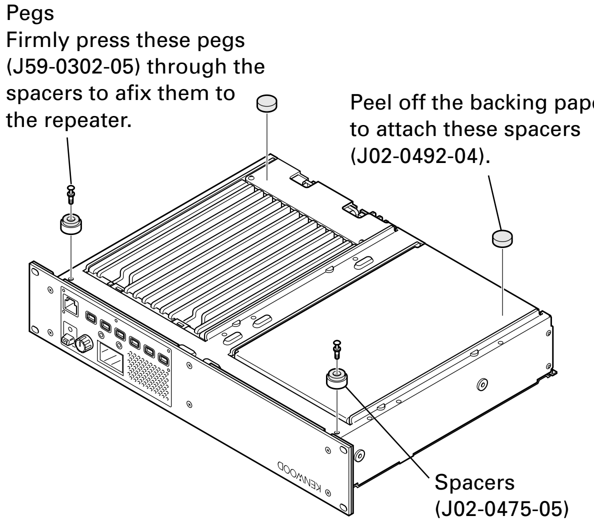


Fig. 7

7. Installing Name Plates

Punch out the name plate card. Then insert the plates onto the reltative function keys.

You can reconfigure the name plates at any time.

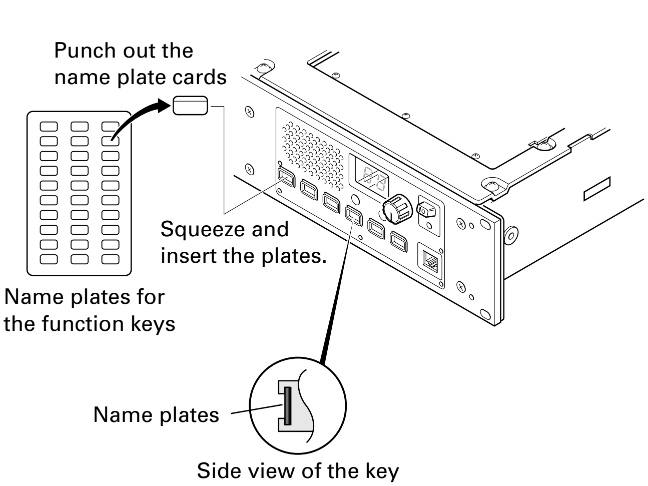


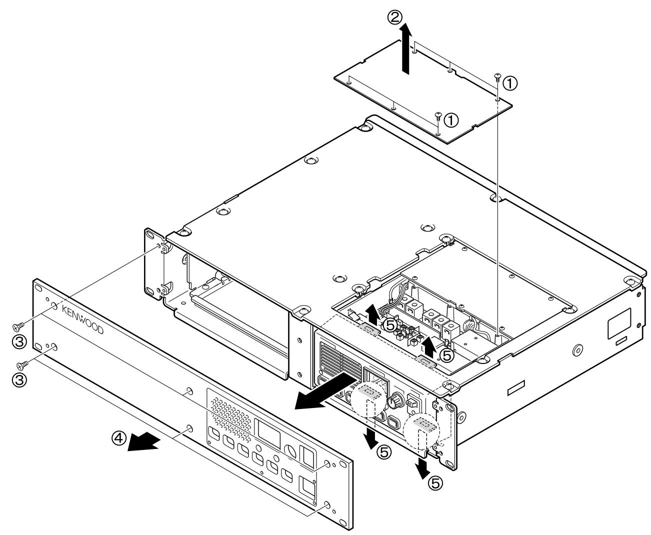
Fig. 8

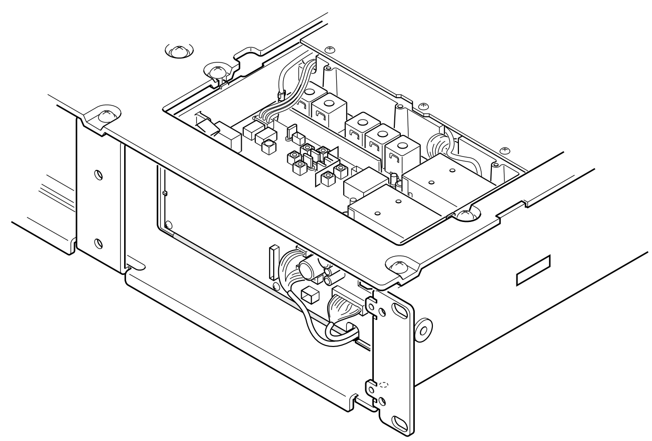
DISASSEMBLY FOR REPAIR

1. How to Remove the Panel Assy (ABS)

Note : You can remove the panel assembly (ABS) without removing the top panel (A62-0840-03).

1. To remove panel (TX-RX, ②), loose 6 screws (①).
2. To remove panel assembly (Front, ④), loose 6 screws (③).
3. The panel assembly (ABS) is security fastened by 4 tabs (⑤) on top and bottom. You can remove the panel assembly by pulling to front while you are pulling up the tabs.





CIRCUIT DESCRIPTION

1. Outline

The TKR-850 is a UHF/FM repeater designed to operate in the frequency range of 440 to 470MHz (E), 450 to 480MHz (K), 480 to 512MHz (K2) or 400 to 430MHz (K3).

The unit consists of receiver, transmitter, phase-locked loop (PLL) frequency synthesizer, and control circuits.

2. Receiver Circuit

The receiver is double conversion super-heterodyne, designed to operate in the frequency range of 440 to 470MHz (E), 450 to 480MHz (K), 480 to 512MHz (K2) or 400 to 430MHz (K3).

The receiver circuit located in TX-RX unit (X57-627 A/2) consists of the following : 2-1 front-end circuit, 2-2 first mixer, 2-3 IF amplifier circuit, 2-4 audio amplifier circuit, and 2-5 squelch circuit.

2-1. Front-end Circuit

The front-end circuit consists of BPF L2, RF amplifier Q1, and BPF L4/L5. The helical BPF covers frequency ranges 440 to 480MHz (K,E) and 480 to 512MHz (K2) with a pass-band of 5.0MHz, 400 to 430MHz with a pass band of 3.0MHz (K3).

The BPF L4/L5 attenuates the unwanted signals, and sends only the necessary signal to the first mixer DBM A1.

2-2. First Mixer

The signal from the BPF is heterodyned with the first local oscillator signal from the PLL frequency synthesizer circuit at the first mixer DBM (A1) to become a 44.85MHz first intermediate frequency (IF) signal. The first IF signal is fed through two monolithic crystal filters (XF2; Wide, XF1; Narrow) to further remove spurious signals.

2-3. IF Amplifier

The first IF signal is amplified by Q2 and Q3, and then enters IC9 (FM system IC). The signal is heterodyned again with a second local oscillator signal (44.395MHz) with in IC9 to become a 455kHz second IF signal. The second IF signal is fed through a 455kHz ceramic filter, CF1 (Wide), CF2 (Narrow) to further eliminate unwanted signal, and the quadrature detection circuit FM-detects the signal to produce a base-band signal and output it from pin 11.

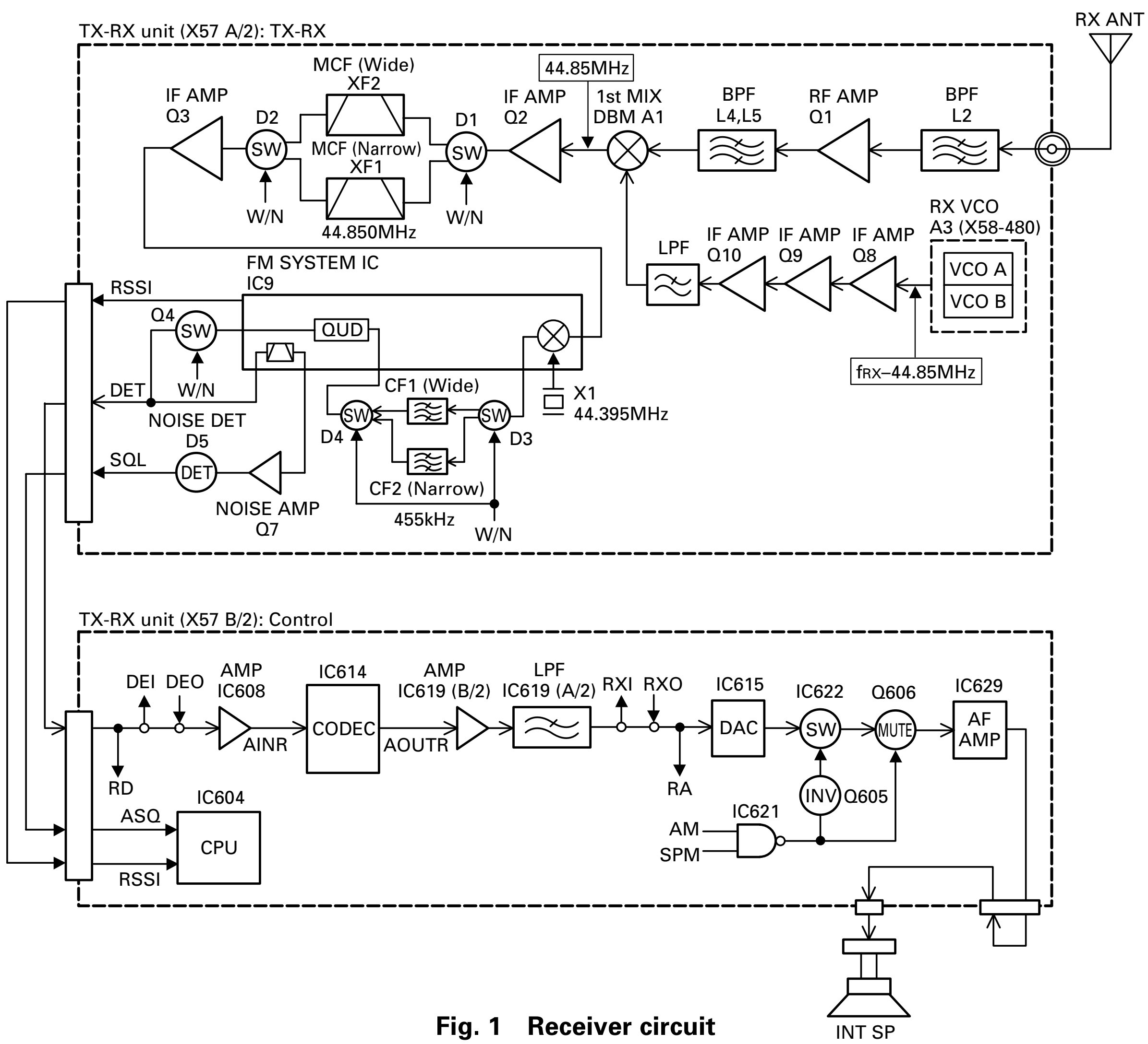


Fig. 1 Receiver circuit

CIRCUIT DESCRIPTION

2-4. Audio Amplifier

The audio amplifier circuit is located in control section of TX-RX unit (X57-627 B/2). The recovered audio signal obtained from IC9 is amplified by IC608, input to the AINR terminal of CODEC IC (IC614), and audio processed by DSP (IC618).

The processed audio signal from AOUTR terminal of IC614 is amplified by IC619 (B/2) to a sufficient level, anti-aliasing filtered by IC619 (A/2). The audio signal goes to an electronic volume (IC615) V3/V4, to the input of multiplexer IC (IC622), and is amplified to drive a loudspeaker by an audio power amplifier (IC629). The 4W audio output can be provided to external 4 ohms speaker through the 15-pin test connector "SPO, SPG" on the rear panel.

2-5. Squelch Circuit

The output signal from IC9 enters FM IC again, then passed through a band-pass filter.

The noise component output from IC9 is amplified by Q7 and rectified by D5 to produce a DC Voltage corresponding to the noise level. The DC voltage is sent to the analog port of the CPU (IC604).

IC9 outputs a DC voltage (RSSI) corresponding to the input of the IF amplifier.

3. Transmitter Circuit

The transmitter circuit consists of the following circuits : 3-1 microphone circuit, 3-2 modulation level adjustment circuit, 3-3 driver and final power amplifier circuit, and 3-4 automatic power control circuit.

3-1. Microphone Circuit

The signal from the microphone is passed through AGC circuit located in display unit (X54-333), so that it does not saturate. This circuit consists of IC501, D501, D502, Q501, and Q502. The AGC is operated by controlling the + and – side levels of amplitude using the current obtained by positive and negative detection of the amplified audio signal. The audio signal goes to control section of TX-RX unit (X57-627 B/2) from display unit (X54-333).

The transmit audio signal goes to the input of the multiplexer IC (IC605) for microphone muting. The audio signal is amplified by IC610, input to the AINL terminal of CODEC IC (IC614), and audio processed by DSP (IC618). The processed audio signal from the AOUTL terminal of IC614 is amplified by IC616 (A/2) to a sufficient level, anti-aliasing filtered by IC616 (B/2), and amplified by the summing amplifier IC611 (A/2).

3-2. Modulation Level Adjustment Circuit

The output of the summing amplifier IC611 (A/2) is passed to an electronic volume (IC615) for maximum deviation adjustment before being applied to a varactor diode in the voltage controlled oscillator (VCO) A2 located in TX-RX unit (X57-627 A/2).

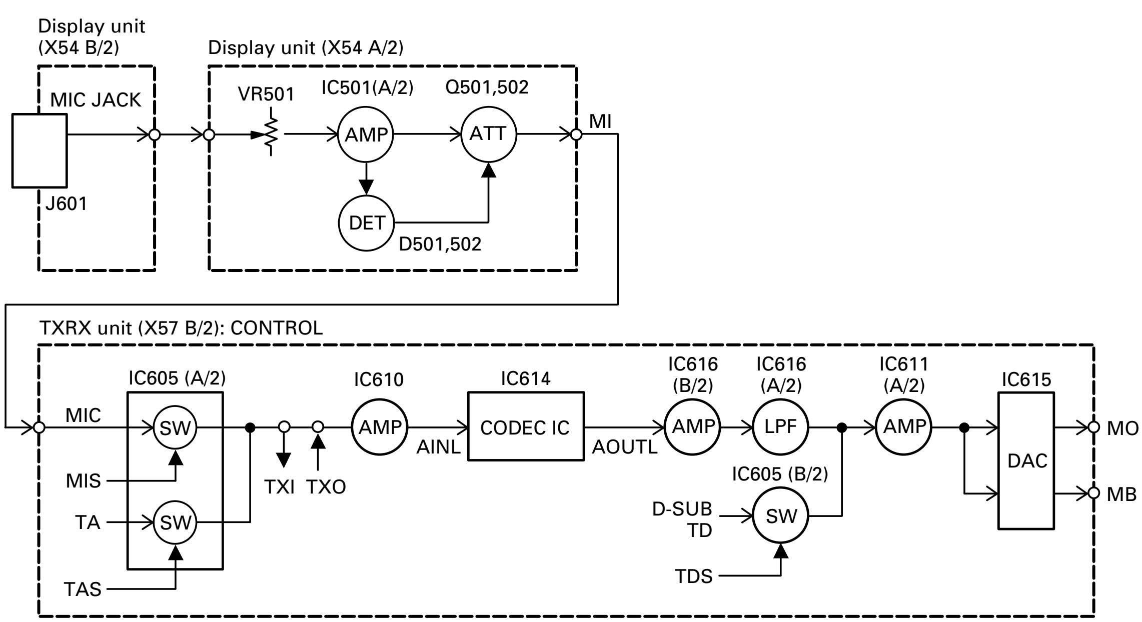


Fig. 2 Microphone circuit

CIRCUIT DESCRIPTION

3-3. Driver and Final Power Amplifier Circuit

The transmit signal is generated by the TX VCO (A2), amplified by Q11, and sent to final unit (X45-363). This amplified signal is amplified by Q1, Q2, Q3, and Q4, and is passed to the FINAL stage. The RF power amplifier consists of MOS FET.

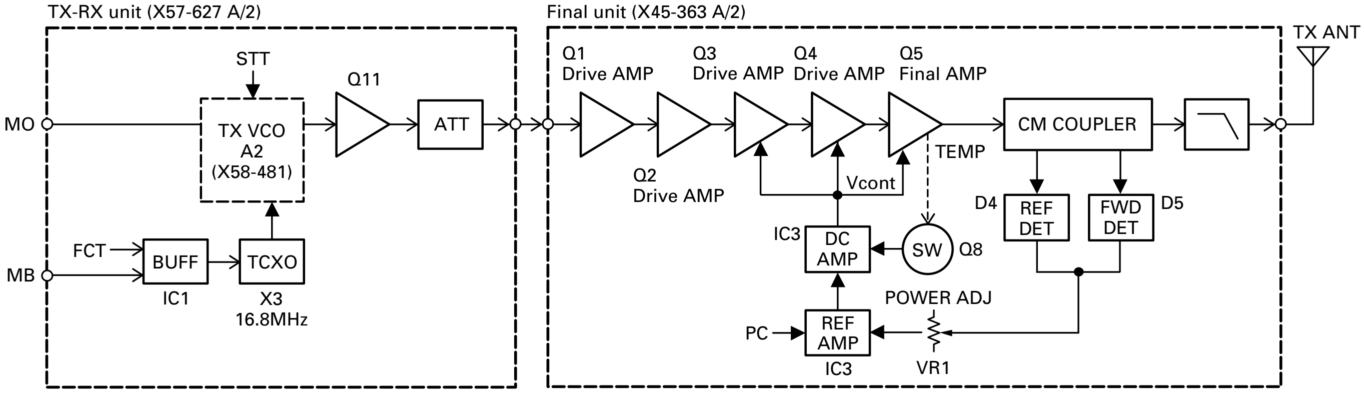


Fig. 3 Driver and final power amplifier circuit

3-4. Automatic Power Control, Circuit and Transmitter

The automatic power control (APC) circuit stabilizes the transmitter output power at a pre-determined level, and consists of forward/reflected power detector circuits, and switching transistor Q8. The forward/reflected power detector circuits detects forward RF power and reflected RF power to DC voltage, and consists of a CM coupling type detection circuit formed by a strip line, RF detector D4/D5, and DC amplifier IC3 (A/2).

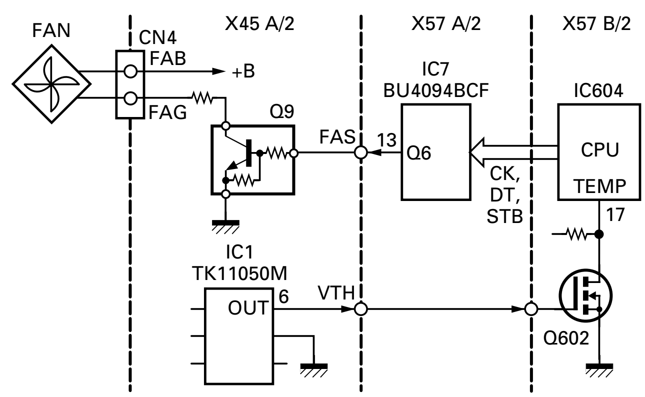
The voltage comparator (IC3 B/2) compares the above detected voltage with a reference voltage, set using the microprocessor and IC6 located in the TX-RX unit. An APC voltage proportional to the difference between the sensed voltage and the reference voltage appears at the output of IC3. This output voltage controls the gate voltage for the drive amplifier Q4 and final amplifier Q5, which keeps the transmitter output power constant.

3-5. Fan Action Control Circuit

If fan action is set to "Temperature", the cooling fan is turned ON or OFF according to temperature.

If the ambient temperature of the final unit exceeds approx. 40°C, the output from pin 6 of the temperature detection IC1 changes from L to H. This signal is sent to the CPU (IC604) by Q602 in the TX-RX unit B/2 (control section), and the output from pin 13 (FAS) of IC7 in the TX-RX unit A/2 controlled by the CPU goes H.

This signal turns Q9 in the final unit ON to run the cooling fan. It has a hysteresis of approx. 5°C by IC2. If fan action is set to "Continuous", the fan operates continuously, but Q9 stays ON.



[Fan operation]

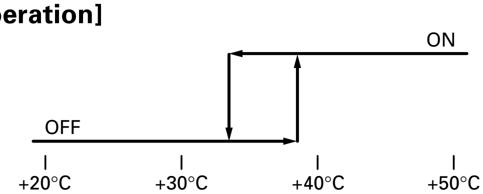


Fig. 4 Fan action control circuit

CIRCUIT DESCRIPTION

4. PLL Frequency Synthesizer

The PLL frequency synthesizer circuit consists of the following circuits : 4-1 receiver PLL circuit, 4-2 transmitter PLL circuit, and 4-3 unlocked detector circuit.

4-1. Receiver PLL

The receiver PLL circuit is located in VCO unit A3 (X58-480) on TX-RX unit (X57-627 A/2), and consists of VCXO X2, VCO's (Q350 and Q351), a single-chip PLL IC IC300, buffer amplifier Q355, and high-frequency amplifier Q302.

The VCXO generates 16.8MHz. The frequency stability is within ±1.5ppm (Temperature range of –30 to +60°C). The frequency tuning of the VCXO is done to apply a voltage to pin 1 of the VCXO. The output of the VCXO is applied to pin 8 of the PLL IC through the pin 7 of the VCO.

The first local oscillator is a lower heterodyne local oscillator, and the VCO oscillator frequency is 405.15 to 435.15MHz (K), 435.15 to 467.15MHz (K2), 355.15 to 385.15MHz (K3), 395.15 to 425.15MHz (E).

The oscillator frequency is controlled by applying the VCO control voltage, obtained from the phase comparator to the varactor diodes.

4-2. Transmitter PLL

The transmitter PLL circuit is located in VCO unit A2 (X58-481) on TX-RX unit (X57-627 A/2), and consists of VCXO X3, VCO's (Q350; K,K2,E type, Q351; K3 type), a single-chip PLL IC IC300, buffer amplifier Q355, and high-frequency amplifier Q302.

The VCXO generates 16.8MHz. The frequency stability is within ±1.5ppm (Temperature range of –30 to +60°C). The frequency tuning and modulation of the VCXO are done to apply a voltage to pin 1 of the VCXO. The output of the VCXO is applied to pin 8 of the PLL IC through the pin 7 of the VCO.

The VCO oscillator frequency is 450.00 to 480.00MHz (K), 480.00 to 512.00MHz (K2), 400.00 to 430.00MHz (K3), 440.00 to 470.00MHz (E).

The oscillator frequency is controlled by applying the VCO control voltage, obtained from the phase comparator to the varactor diodes.

4-3. Unlock Detector Circuit

If a pulse signal appears at the LD pin of IC300, an unlock condition occurs, causing the voltage applied to the pin of the microprocessor to go low. The names of this pin are LDT for TX PLL and LDR for RX PLL. When the microprocessor detects this condition, the transmitter is disabled.

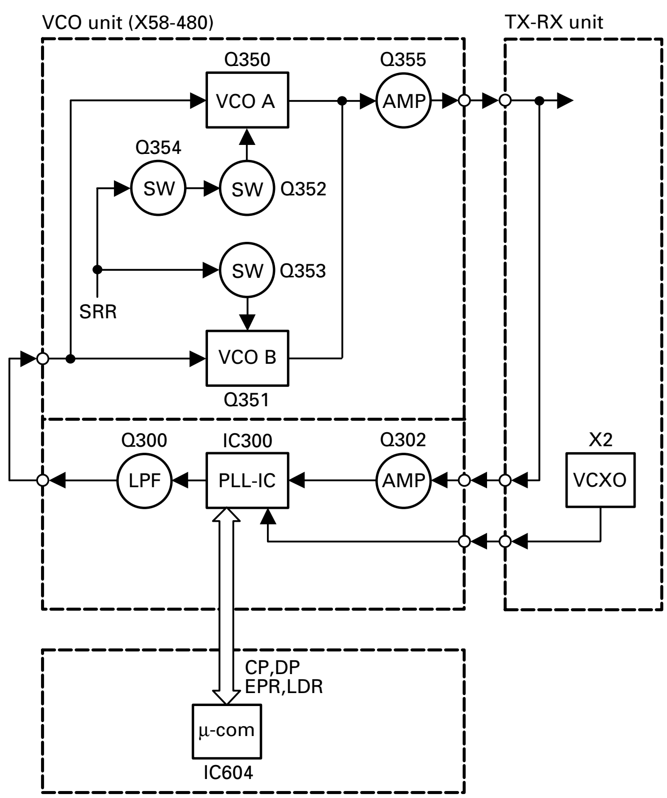


Fig. 5 Receiver PLL

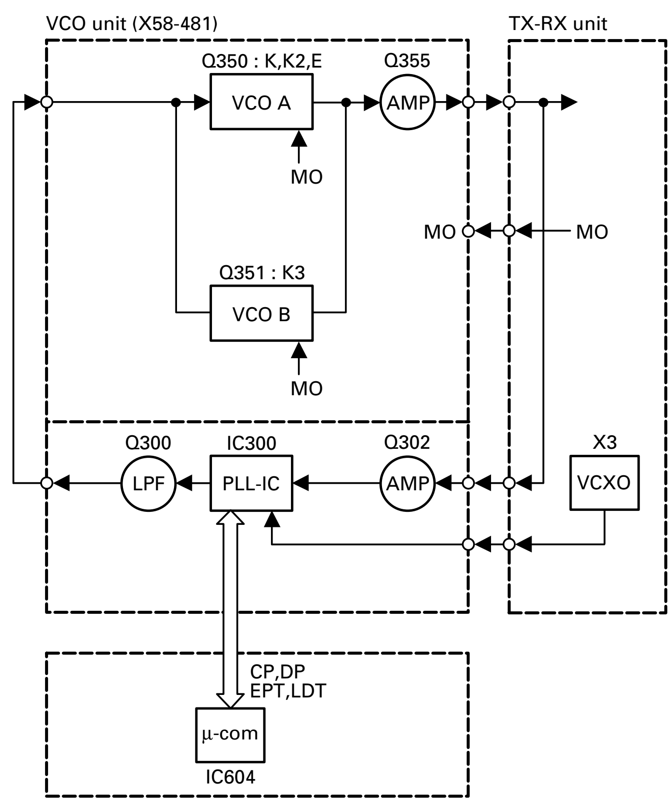


Fig. 6 Transmitter PLL

CIRCUIT DESCRIPTION

5. Control Circuit

The control circuit mainly located in the control section of TX-RX unit (X57-627 B/2) consists of the following : 5-1 CPU, 5-2 memory circuit, 5-3 CPU clock shift, 5-4 shift register circuit, 5-5 display circuit, 5-6 DSP circuit, 5-7 base-band circuit, 5-8 RS-232C circuit, and 5-9 power supply circuit.

5-1. CPU

The CPU (IC604) is a 16bit single-chip microcomputer containing a 32k ROM and 3k RAM. This CPU controls the flash ROM, the DSP, the receiver circuit, the transmitter circuit, the control circuit, and the display circuit and transfers data to or from an external device.

5-2. Memory Circuit

IC609 has a flash ROM with a capacity of 2M bits that contains the control program for the CPU, the signal processing program for DSP and data such as channels and operating features.

This program can be easily written from an external device. Data such as the operating status are programmed into the EEPROM (IC600).

5-3. CPU Clock Shift

There are the 14.754MHz clock for the CPU (IC604) and the 16.515MHz clock for the DSP (IC618) at the control section of TX-RX unit (X57-627). When these clocks are multiplexed with the reception frequency, they become an internal beat signal. To prevent this, by tuning Q600 and Q604 on the clock frequency is shifted. (Shift on/off can be set through programming.)

5-4. Shift Register Circuit

Serial data is sent to the shift register (IC502 to IC505 located in display unit, IC602, IC623, IC7 located in TX-RX unit) from the CPU (IC604) to control various functions in the unit.

5-5. Display Circuit

The display circuit (X54-333) contains two 7-segment LEDs D506, D507 (orange : see the operation manual for details of display), D503 (red : transmission), D504 (green : busy), two-color LED D505 (red : backup, green : main DC), LEDs in switches S501 to S506, IC502, IC503, IC504, and IC505 to display this model channels and states.

IC502 to IC505 are shift registers which convert serial data from the CPU to parallel data and light LEDs.

Q507, Q510, and Q511 are switching transistors which control two-color LED D505.

IC506, and IC507 are three-pin power supply ICs which produce power used for the display circuit.

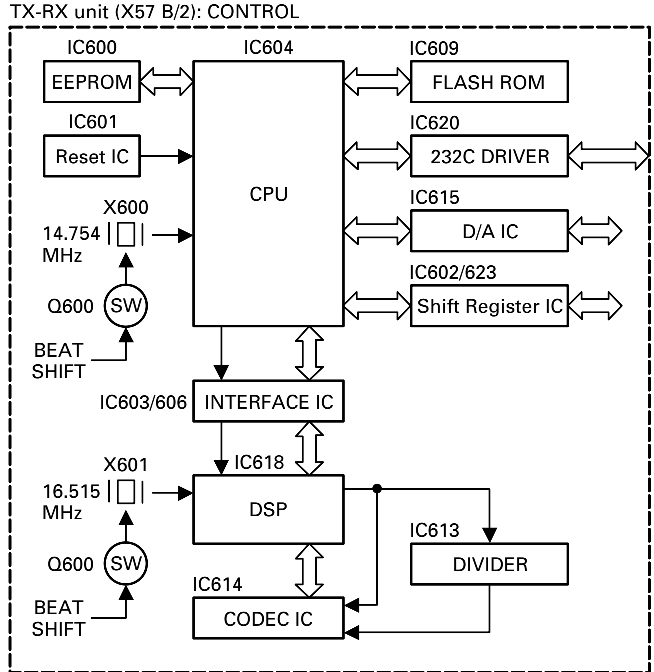


Fig. 7 Control circuit

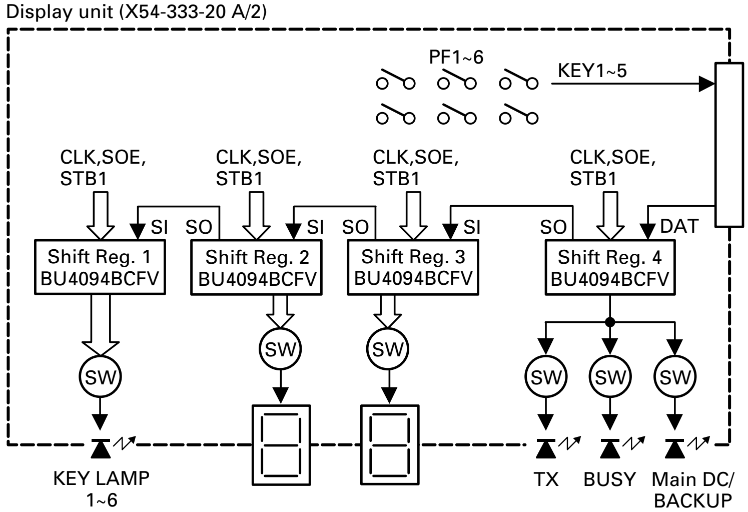


Fig. 8 Display circuit

CIRCUIT DESCRIPTION

5-6. DSP

The DSP circuit filters transmit/receive audio signal and encode/decodes signaling (QT, DQT). This circuit consists of IC618, IC612, IC613, IC614, IC603, IC606, IC608, IC610, IC616, and IC619.

The receive signal DET is converted from analog to digital by IC614 with a sampling frequency of 16.128kHz. The digitized audio signal is sent to DSP IC618 to process the signaling signal and audio signal. The processed digital audio signal is fed to CODEC IC613, converted from digital to analog, and the analog signal is output from pin 16 (AOUTR). Then, the audio signal is amplified by IC619 (B/2), passes through the IC619 (A/2) low-pass filter, and goes to an electronic volume IC615.

The transmit audio signal coming from IC605 is amplified by IC610, fed to pin 3 (AINL) of CODEC IC614, and converted from analog to digital at a sampling frequency of 16.128kHz. The digitized transmit audio signal is AGC-processed, pre-emphasized and filtered at 300Hz to 3kHz by DSP IC618, and the resulting signal is fed back to CODEC IC614, and converted from digital to analog, and the analog signal is output from pin 15 (AOUTL). The transmit signal from AOUTL is amplified by IC616 (B/2), passes through the IC616 (A/2) low-pass filter, and goes to the IC611 (A/2) summing amplifier.

IC613 is a counter IC and the clock required for the CODEC and DSP is generated by dividing the 16.515MHz clock signal produced by DSP IC618.

IC603 and IC606 are interface IC between the CPU operated at 5.0V and the DSP operated at 3.3V.

5-7. Base-Band Circuit

The base-band circuit switches between the modulation signal to the transmitter circuit, and remote audio and adjusts their levels. This circuit consists of IC605, IC607, IC611, IC615, and IC617.

Modulation inputs include local microphone input, low-speed data (LSD), high-speed data (HSD), external audio input (TA), and external data input (TD), and demodulation outputs include receive audio output (RA), and receive data output (RD).

The multiplexer (IC605) changes signals, the electronic volume (IC615) adjusts the level, and the operational amplifier (IC607, IC611, IC617) amplifiers and sums signals.

5-8. RS-232C Circuit

The RS-232C circuit connects the RS-232C serial port of a personal computer directly to this model to perform FPU operation. The FPU operation can also be performed by connecting a programming cable (KPG-46) to the local microphone on the front panel. But, if the D-sub connector on the rear panel is used, the programming cable is not required. The 232C driver IC (IC620) changes the TTL-232C level. The firmware can only be rewritten with the local microphone on the front panel.

5-9. Power Supply Circuit

The power supply circuit generates power to operate the CPU, DSP, flash ROM, bi-directional buffer, and base-band circuit. This circuit consists of IC624, IC625, IC626, IC627, IC628, and IC630.

6. DC Power Supply Circuit

6-1. DC Source Switching Relay Circuit

1. The final unit contains a relay (K1) for switching between the Main DC and Backup Battery.
   If an external power source is connected to the Main DC terminal, the Backup terminal is isolated by the relay. If the Main DC turns OFF due to power failure, it is switched to the Backup terminal by the relay.
   The CPU monitors which is used, Main DC or Backup Battery.
2. Trickle charge circuit
   If both Main DC and Backup Battery are connected, trickle charging of 0.5 A max. can be performed from the Main DC power supply to the Battery.
   (The default is OFF. See the Modification section for information on the modification method.)
   The battery is charged from the Main DC with D8, D9 and R61. If it exceeds 0.5 A, the charging circuit is turned OFF by D9.

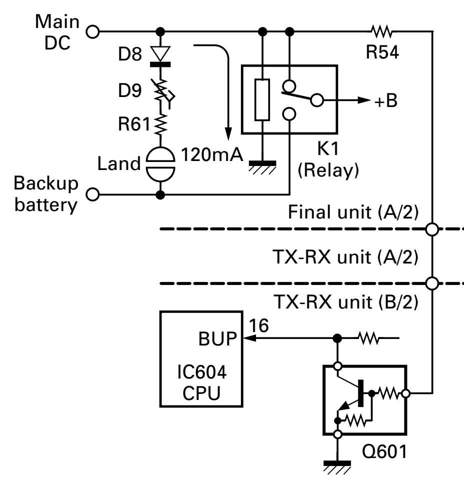


Fig. 9 DC source switching relay circuit

6-2. SB Switching Relay Circuit

1. SB (Switched +B) is supplied through the relay (K1) in the TX-RX unit A/2.
   When S507 (DC source switch) in the display unit is turned ON, the relay (K1) is turned ON to output SB.
2. If +B exceeds 18V, the relay is forcibly turned OFF by D12 and Q25 to interrupt the power and protect the main unit.

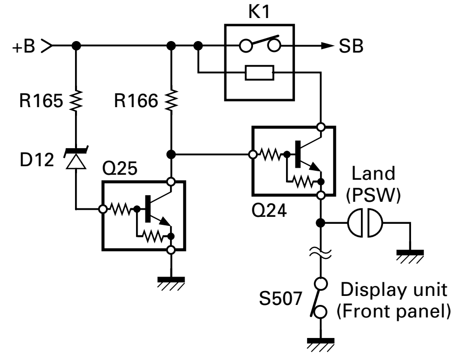


Fig. 10 SB switching relay circuit

SEMICONDUCTOR DATA

Main CPU : 30622M4-113GP (TX-RX unit IC604)

■ Pin Function

Pin No.	Name	I/O	Function
1~5	IO5~IO1	I/O	Aux I/O No.5~No.1 (Acc D-sub 25 pin)
6	BYTE	–	5V
7	CNVss	–	GND
8	ENT	O	TX PLL IC enable
9	ENR	O	RX PLL IC enable
10	Reset	I	Microcomputer reset input
11	Xout	–	14.7456MHz
12	Vss	–	GND
13	Xin	–	14.7456MHz
14	Vcc	–	5V
15	NMI	–	Not used
16	BUP	I	Backup battery detect H : Backup, L : Main
17	TEMP	I	Temperature detect for fan action H : Temp high, L : Temp low
18	EPTT	I	Acc PTT (Acc D-sub 25 pin) H : Off, L : On
19	CLK	O	Common clock
20	DAT	O	Common data
21	SFT	O	Beat shift H : On, L : Off
22	LD1	O	Control D/A converter LD
23	STB3	O	Control shift register STB
24	LD2	O	TX/RX D/A converter LD
25	STB4	O	TX/RX shift register STB
26	RS	O	DSP reset H : Off, L : On
27	SC	O	Squelch control (Acc D-sub 25 pin) H : Inactive, L : Active
28	PTT	I	Mic PTT H : Off, L : On
29	TXD1	O	Mic TXD
30	RXD1	I	Mic HOOK/RXD
31	SCLK	O	EEPROM clock
32	SDAT	I/O	EEPROM data
33	TXD0	O	Acc TXD (Acc D-sub 25 pin)
34	RXD0	I	Acc RXD (Acc D-sub 25 pin)
35	CP	O	PLL IC clock
36	DP	O	PLL IC data
37	RDY	I	CPU ready input
38	ALE	–	Not used
39	HOLD	–	Not used

Pin No.	Name	I/O	Function
40	HLDA	–	Not used
41	BCLK	O	Not used
42	RD	O	Flash ROM WR/DSP HDS1
43	BHE	–	Not used
44	WR	O	Flash ROM WR/DSP HDS2
45	STB2	O	Control shift register STB
46	INTx	O	DSP interrupt H : Off, L : On
47	HCS	O	DSP HCS
48	CS0	O	Flash ROM CS
49	A19	O	Not used
50~59	A18~A9	O	Flash ROM address bus
60	Vcc	–	5V
61	A8	O	Flash ROM address bus
62	Vss	–	GND
63~70	A7~A0	O	Flash ROM address bus
71	EMON	I	Acc monitor (Acc D-sub 25 pin) H : Off, L : On
72	LDR	I	RX VCO lock detect H : Lock, L : Unlock
73	LDT	I	TX VCO lock detect H : Lock, L : Unlock
74,75	KEY5,KEY4	O	Key matrix output
76~78	KEY3~KEY1	I	Key matrix input
79~86	D7~D0	I/O	Flash ROM data bus
87	FWD	I	RF power down level input
88	RSSI	I	RSSI level input
89	ASQ	I	Squelch level input
90	VLI	I	Volume level input
91	BATT	I	Power supply voltage level input
92	AI1	I	Aux input No.1 (Acc D-sub 25 pin)
93	AI2	I	Aux input No.2 (Acc D-sub 25 pin)
94	AVss	–	GND
95	AI3	I	Aux input No.3 (Acc D-sub 25 pin)
96	Vref	–	5V
97	AVcc	–	5V
98	STB1	O	Display shift register STB
99	SOE	O	Shift register common OE
100	IO6	I/O	Aux I/O No.6 (Acc D-sub 25 pin)

SEMICONDUCTOR DATA

DSP : 320VC5402PGE (TX-RX unit IC618)

■ Pin Function

Pin No.	Name	I/O	Function
1,2	NC1,NC2	–	Not used (No connection)
3	Vss	–	GND
4	DVDD	–	VDD for I/O pins (+3.3V)
5	A0	O	Not used (No connection)
6	HD0	I/O	HPI data bus
7~11	A1~A5	O	Not used (No connection)
12	NC3	–	Not used (No connection)
13	HAS	I	HPI address strobe (Pull up)
14	Vss	–	GND
15	NC4	–	Not used (No connection)
16	CVDD	–	VDD for core CPU (+1.8V)
17	HCS	I	HPI chip select
18	HR/W	I	HPI read/write
19	READY	I	Data ready (Pull up)
20	PS	O	Not used (No connection)
21	DS	O	Not used (No connection)
22	IS	O	Not used (No connection)
23	R/W	O	Not used (No connection)
24	MSTRB	O	Not used (No connection)
25	IOSTRB	O	Not used (No connection)
26	MSC	O	Not used (No connection)
27	XF	O	CODEC control H : Power down, L : Active
28	HOLDA	–	Not used (No connection)
29	IAQ	–	Not used (No connection)
30	HOLD	I	Hold (Pull up)
31	BIO	I	Serial data syncronize input
32	MP/MC	I	Not used (Pull down)
33	DVDD	–	VDD for I/O pins (+3.3V)
34	Vss	–	GND
35~38	NC5~NC8	–	Not used (No connection)
39	HCNTL0	I	HPI control 0
40	Vss	–	GND
41	BCLKR0	I	Receive clock input (SCLK : 516.09375kHz)
42	BCLKR1	–	Not used (No connection)
43	BFSR0	I	Frame sync. for receiver input (LRCK : 16.128kHz)

Pin No.	Name	I/O	Function
44	BFSR1	I	Frame sync. for receiver input (LRCK : 16.128kHz)
45	BDR0	I	Serial data receive input
46	HCNTL1	I	HPI control 1
47	BDR1	–	Not used (No connection)
48	BCLKX0	I	Transmit clock input (SCLK : 516.09375kHz)
49	BCLKX1	O	Master clock output (MCLK : 4.12875MHz)
50	Vss	–	GND
51	HINT/TOUT1	O	Boot mode select (Pull up)
52	CVDD	–	VDD for core CPU (+1.8V)
53	BFSX0	I	Frame sync. for transmitter input (LRCK : 16.128kHz)
54	BFSX1	I	Frame sync. for transmitter input (LRCK : 16.128kHz)
55	HRDY	–	Not used (No connection)
56	DVDD	–	VDD for I/O pins (+3.3V)
57	Vss	–	GND
58	HD1	I/O	HPI data bus
59	BDX0	O	Serial data transmit output
60	BDX1	–	Not used (No connection)
61	IACK	–	Not used (No connection)
62	HBIL	I	Byte identification (HPI)
63	NMI	I	Not used (Pull up)
64	INT0	I	Command interrupt from host CPU
65	INT1	I	Not used (Pull up)
66	INT2	I	Boot mode select (Pull up)
67	INT3	I	Not used (Pull up)
68	CVDD	–	VDD for core CPU (+1.8V)
69	HD2	I/O	HPI data bus
70	Vss	–	GND
71~74	NC9~NC12	–	Not used (No connection)
75	DVDD	–	VDD for I/O pins (+3.3V)
76	Vss	–	GND
77	CLKMD1	I	Clock mode select (Pull down)
78	CLKMD2	I	Clock mode select (Pull up)
79	CLKMD3	I	Clock mode select (Pull down)

SEMICONDUCTOR DATA / DESCRIPTION OF COMPONENTS

Pin No.	Name	I/O	Function
80	NC13	–	Not used (No connection)
81	HD3	I/O	HPI data bus
82	TOUT0	–	Not used (No connection)
83	EMU0	I/O	Emulator 0 (to JTAG connector)
84	EMU1/OFF	I/O	Emulator 1 (to JTAG connector)
85	TDO	O	Test data output (to JTAG connector)
86	TDI	I	Test data input (to JTAG connector)
87	TRST	I	Test reset (to JTAG connector)
88	TCK	I	Test clock (to JTAG connector)
89	TMS	I	Test mode select (to JTAG connector)
90	NC14	–	Not used (No connection)
91	CVDD	–	VDD for core CPU (+1.8V)
92	HPIENA	I	Not used (Pull up)
93	Vss	–	GND
94	CLKOUT	O	Not used (No connection)
95	HD4	I/O	HPI data bus
96	X1	–	16.515MHz (System clock)
97	X2/CLKIN	–	16.515MHz (System clock)
98	RS	I	DSP reset input
99~104	D0~D5	–	Not used (No connection)
105	A6	O	Not used (No connection)
106	Vss	–	GND
107~109	A7~A9	O	Not used (No connection)
110	NC15	–	Not used (No connection)
111	Vss	–	GND
112	DVDD	–	VDD for I/O pins (+3.3V)
113~119	D6~D12	–	Not used (No connection)
120	HD5	I/O	HPI data bus
121~123	D13~D15	–	Not used (No connection)
124	HD6	I/O	HPI data bus
125	CVDD	–	VDD for core CPU (+1.8V)
126	NC16	–	Not used (No connection)
127	HDS1	I	HPI data strobe 1 (Pull up)
128	Vss	–	GND
129	HDS2	I	HPI data strobe 2 (Pull down)
130	DVDD	–	VDD for I/O pins (+3.3V)
131~134	A10~A13	O	Not used (No connection)
135	HD7	I/O	HPI data bus
136~141	A14~A19	O	Not used (No connection)
142	CVDD	–	VDD for core CPU (+1.8V)
143,144	NC17,NC18	–	Not used (No connection)

Final Unit (X45-3630-XX)

Ref No.	Part name	Description
IC1	IC	Thermostat
IC2	IC	Voltage regulator
IC3	IC	DC amplifier
Q1,2	Transistor	RF amplifier
Q3	FET	RF amplifier
Q4	FET	TX drive amplifier
Q5	FET	Final amplifier
Q7	FET	RF switch
Q8,9	Transistor	DC switch
D2	Zener diode	Voltage reference
D3	Diode	Surge absorption
D4,5	Diode	RF detector
D7	Zener diode	Surge protector
D8	Diode	Reverse current protection
D9	Varistor	Current protector
D10	Diode	Surge protector
D51,52	Diode	Reverse connection protection

Display Unit (X54-3330-20)

Ref No.	Part name	Description
IC501	MOS IC	MIC amplifier
IC502~505	MOS IC	Shift registers
IC506,507	MOS IC	Voltage regulator
Q501,502	Transistor	Level controller
Q504	FET	DC switch
Q506	Transistor	DC switch
Q507	FET	DC switch
Q508	Transistor	DC switch
Q510,511	Transistor	DC switch
Q512~514	FET	DC switch
Q516~519	FET	DC switch
Q521~524	FET	DC switch
Q525	FET	PTO switch
D501,502	Diode	AF detector
D503~505	LED	LED
D506,507	LED	7 segment
D508~514	Diode	Surge absorption
D601,602	Diode	Surge absorption
D603	Varistor	Current protector

DESCRIPTION OF COMPONENTS

TX-RX Unit (X57-6270-XX)

Ref No.	Part name	Description
IC1,2	IC	Buffer amplifier
IC3~5	IC	Voltage regulator
IC6	IC	D/A converter
IC7	IC	Shift register
IC9	IC	FM IF system
IC10,11	IC	Voltage regulator
IC600	IC	EEPROM
IC601	IC	Voltage detector
IC602	IC	Shift register
IC603	IC	Bus transceiver
IC604	MPU	CPU
IC605	IC	Multiplexer
IC606	IC	Bus transceiver
IC607,608	IC	AF amplifier
IC609	IC	Flash ROM
IC610,611	IC	AF amplifier
IC612	IC	Inverter
IC613	IC	Counter
IC614	IC	CODEC
IC615	IC	D/A converter
IC616,617	IC	AF amplifier
IC618	MPU	DSP
IC619	IC	AF amplifier
IC620	IC	RS-232C transceiver
IC621	IC	NAND gate
IC622	IC	Multiplexer
IC623	IC	Shift register
IC624~628	IC	Voltage regulator
IC629	IC	Audio amplifier
IC630	IC	Voltage regulator
Q1~3	Transistor	RF amplifier
Q4	Transistor	Wide/Narrow switch
Q5,6	Transistor	DC switch
Q7	Transistor	Noise amplifier
Q8,9	Transistor	RF amplifier
Q10	Transistor	Current control
Q11	Transistor	RF amplifier
Q12~15	Transistor	Ripple filter
Q16~19	Transistor	DC switch
Q20	Transistor	Inverter
Q23~25	Transistor	DC switch
Q26	Transistor	Wide/Narrow switch
Q600	FET	DC switch
Q601	Transistor	DC switch
Q602	FET	DC switch
Q603	Transistor	Inverter
Q604	FET	DC switch
Q605	Transistor	Inverter
Q606	Transistor	AF mute switch
Q609	Transistor	DC switch
Q610	FET	DC switch
Q611	Transistor	DC switch
D1~4	Diode	Wide/Narrow switch
D5	Diode	Noise detection
D7	Diode	DC switch
D8	Diode	TX switch
D9	Diode	Surge protector
D11	Zener diode	Surge protector
D12	Zener diode	Voltage reference
D13	Diode	Noise detection
D600	Diode	Surge protector
D601	Diode	Voltage reduction
D606~625	Diode	Surge protector
D626	Varistor	Current protector
D627,628	Diode	reverse current protector
D629	Diode	Surge protector

RX PLL/VCO Unit (X58-4800-XX)

Ref No.	Part name	Description
IC300	IC	PLL
Q300,301	Transistor	Active filter
Q302	Transistor	Buffer amplifier
Q350,351	FET	VCO OSC
Q352~354	Transistor	DC switch
Q355	Transistor	Buffer amplifier
D350~353	Varicap	Frequency control

TX PLL/VCO Unit (X58-4810-XX)

Ref No.	Part name	Description
IC300	IC	PLL
Q300,301	Transistor	Active filter
Q302	Transistor	Buffer amplifier
Q350,351	FET	VCO OSC
Q355	Transistor	Buffer amplifier
D350~353	Varicap	Frequency control
D354,355	Varicap	Modulation

PARTS LIST

✻New Parts. ⚠ indicates safety critical components.
Parts without **Parts No.** are not supplied.
Les articles non mentionnes dans le **Parts No.** ne sont pas fournis.
Teile ohne **Parts No.** werden nicht geliefert.

L : Scandinavia **K**: USA **P** : Canada
Y: PX (Far East, Hawaii) **T** : England **E** : Europe
Y: AAFES (Europe) **X**: Australia **M**: Other Areas

TKR-850
FINAL UNIT (X45-3630-XX)

TKR-850

Ref. No.	Address	New parts	Parts No.	Description	Desti-nation
1	2B	✻	A10-4037-11	CHASSIS ADC12	
2	1B	✻	A62-0836-04	PANEL TX-RX	
3	1B	✻	A62-0837-04	PANEL FINAL	
4	1D	✻	A62-0840-03	PANEL OUTER	
5	3A	✻	A62-0933-13	PANEL ASSY	
6	3C	✻	A62-0934-03	PANEL ASSY	
8	1F	✻	B10-2635-04	FRONT GLASS F-KEY	
-		✻	B10-2636-04	FRONT GLASS PC SHEET	
10	1F	✻	B11-1259-04	FILTER F-KEY	
11	1F	✻	B62-1327-10	INSTRUCTION MANUAL	
12	2C,3D	✻	B72-1935-04	MODEL NAME PLATE	K
12	2C,3D	✻	B72-1936-04	MODEL NAME PLATE	K2
12	2C,3D	✻	B72-1937-04	MODEL NAME PLATE	E
12	2C,3D	✻	B72-1975-14	MODEL NAME PLATE	K3
14	2C	✻	E30-3414-05	DC CORD	
15	1C	✻	E30-3418-05	ANTENNA CABLE (BNC)	
16	2C	✻	E30-3419-05	ANTENNA CABLE (N)	
17	1E	✻	E30-3427-15	DC CORD (ACC)	
18	1E		E31-3228-05	LEAD WIRE WITH CONNECTOR	
-			E37-0808-05	LEAD WIRE WITH CONNECTOR	
20	1B	✻	E37-0902-05	LEAD WIRE WITH TERMINAL (DC+)	
21	1B	✻	E37-0903-05	LEAD WIRE WITH TERMINAL (DC-)	
22	2C	✻	E37-0904-05	LEAD WIRE WITH CONNECTOR (D-SUB)	
23	3B	✻	E37-0905-05	LEAD WIRE WITH CONNECTOR (SP)	
24	3A	✻	E37-0906-05	LEAD WIRE WITH CONNECTOR (CONT-DISP)	
25	3A	✻	E37-0908-05	LEAD WIRE WITH CONNECTOR (11P)	
26	1B	✻	E37-0909-05	LEAD WIRE WITH CONNECTOR (8P)	
27	1B	✻	E37-0911-05	LEAD WIRE WITH CONNECTOR (3P)	
28	1B	✻	E37-0912-05	LEAD WIRE WITH MINIPIN PLUG	
29	2C	✻	E37-0913-05	LEAD WIRE WITH CONNECTOR (15P)	
30	1B	✻	E37-0934-05	LEAD WIRE WITH TERMINAL (ORANGE)	
-		✻	E37-0964-05	LEAD WIRE WITH TERMINAL (BLACK)	
-		✻	E37-0965-05	LEAD WIRE WITH TERMINAL (RED)	
33	2B	✻	E37-0967-05	FLAT CABLE (36P)	
34	2C	✻	E70-0402-05	TERMINAL BOARD	
36	1C,1E		F05-1537-05	FUSE (BLADE) 15A/32V	
37	2C		F09-0445-05	CAP (D-SUB)	
38	1C		F09-0471-05	FANMOTOR	
-		✻	F10-2374-04	SHIELDING PLATE (TX-RX)	
-		✻	F10-2379-04	SHIELDING CASE (TX-RX COM)	
-		✻	F10-2409-04	SHIELDING CASE (TX-RX FOIL)	
42	1C	✻	F20-3322-04	INSULATING SHEET	
44	1B		G02-0576-14	FLAT SPRING	
-			G02-0829-14	FLAT SPRING	
46	3B	✻	G02-0885-13	EARTH SPRING	
47	2B,3B	✻	G10-1263-04	FIBROUS SHEET (CHASSIS)	
48	3C,2D	✻	G10-1264-04	FIBROUS SHEET (PANEL)	
49	1F	✻	G13-1801-04	CUSHION (ACC)	
50	1F	✻	G13-1802-04	CUSHION (ACC)	
-		✻	G13-1886-04	CUSHION	
53	1E		H25-0029-04	PROTECTION BAG (60/110/0.07)	
54	1F		H25-0747-04	PROTECTION BAG (250X350)	
55	1E		H25-0762-04	PROTECTION BAG (120X300)	
56	1F	✻	H25-2328-04	PROTECTION BAG (80/250/0.07)	
57	3F	✻	H52-1779-02	ITEM CARTON CASE	
59	1E		J02-0475-05	FOOT	
60	1E	✻	J02-0492-04	FOOT	
61	1F	✻	J21-8402-04	HARDWARE FIXTURE (ACC)	
62	1E	✻	J59-0302-05	GROMMET	
64	1E		K01-0418-05	HANDLE (ACC)	
65	3A		K29-5389-03	KNOB (VOL)	
66	3A	✻	K29-5460-02	KEY TOP	
67	3A	✻	K29-9106-04	KNOB (DC SOURCE)	
A	2C		N09-2292-05	HEXAGON HEAD SCREW	
B	2C		N15-1030-46	FLAT WASHER	
C	1C,2C		N30-2606-46	PAN HEAD MACHINE SCREW	
D	2A,1E		N30-4006-46	PAN HEAD MACHINE SCREW	
E	2B,2C		N30-4014-46	PAN HEAD MACHINE SCREW	
F	1C	✻	N30-4020-45	PAN HEAD MACHINE SCREW	
G	2C		N32-3006-46	FLAT HEAD MACHINE SCREW	
H	3B		N32-4008-45	FLAT HEAD MACHINE SCREW	
J	1B		N33-3006-45	OVAL HEAD MACHINE SCREW	
K	1E	✻	N35-3006-45	BINDING HEAD MACHINE SCREW	
L	2C		N35-3014-46	BINDING HEAD MACHINE SCREW	
M	1C		N35-4006-45	BINDING HEAD MACHINE SCREW	
N	1B,3B	✻	N67-3008-46	PAN HEAD SEMS SCREW W	
O	1C,2C		N87-2606-46	BRAZIER HEAD TAPTITE SCREW	
P	3A	✻	N87-3005-45	BRAZIER HEAD TAPTITE SCREW	
Q	2B,3B		N87-3006-46	BRAZIER HEAD TAPTITE SCREW	
69	3A		T07-0247-05	SPEAKER	

FINAL UNIT (X45-3630-XX) -10 : K,E -11 : K2 -12 : K3

Ref. No.	Address	New parts	Parts No.	Description	Desti-nation
C1			CC73GCH1H100D	CHIP C 10PF D	
C3			C90-2146-05	ELECTRO 100UF 25WV	
C4,5			CK73FB1E104K	CHIP C 0.10UF K	
C6,7			CK73GB1H471K	CHIP C 470PF K	
C8			CC73GCH1H030C	CHIP C 3.0PF C	K,K2,E
C8			CC73GCH1H100D	CHIP C 10PF D	K3
C9			CK73FB1E104K	CHIP C 0.10UF K	
C10			CK73GB1H471K	CHIP C 470PF K	
C12-15			CK73GB1H471K	CHIP C 470PF K	
C16			CK73FB1E104K	CHIP C 0.10UF K	
C17			CC73GCH1H270J	CHIP C 27PF J	K2
C17			CC73GCH1H390J	CHIP C 39PF J	K,E
C17			CC73GCH1H560J	CHIP C 56PF J	K3
C18,19			CK73GB1H471K	CHIP C 470PF K	
C20			CK73FB1H471K	CHIP C 470PF K	
C21			CC73FCH1H120J	CHIP C 12PF J	K,K2,E
C21			CC73FCH1H220J	CHIP C 22PF J	K3
C22			CC73FCH1H090D	CHIP C 9.0PF D	K,K2,E
C22			CC73FCH1H120J	CHIP C 12PF J	K3
C23			CK73FB1H471K	CHIP C 470PF K	
C24			C90-4016-05	ELECTRO 47UF 16WV	

PARTS LIST

FINAL UNIT (X45-3630-XX)

Ref. No.	Address	New parts	Parts No.	Description	Desti-nation
C25			CK73FB1E104K	CHIP C 0.10UF K	
C26			CC73GCH1H101J	CHIP C 100PF J	
C27			CK73GB1H471K	CHIP C 470PF K	
C28			CK73FB1E104K	CHIP C 0.10UF K	
C29			CK73GB1H471K	CHIP C 470PF K	
C30			CK73FB1E104K	CHIP C 0.10UF K	
C31			C93-0599-05	CHIP C 470PF K	
C32			C93-0558-05	CHIP C 8.0PF D	K2
C32			C93-0561-05	CHIP C 12PF J	K,E
C32			C93-0563-05	CHIP C 18PF J	K3
C33			C93-0563-05	CHIP C 18PF J	K2
C33,34			C93-0565-05	CHIP C 27PF J	K,K3,E
C34			C93-0565-05	CHIP C 27PF J	K2
C35			C93-0599-05	CHIP C 470PF K	
C38			CK73GB1H471K	CHIP C 470PF K	
C39			C93-0599-05	CHIP C 470PF K	
C41			C93-0566-05	CHIP C 33PF J	K,K2,E
C41,42			C93-0566-05	CHIP C 33PF J	K3
C42			C93-0562-05	CHIP C 15PF J	K2
C42			C93-0563-05	CHIP C 18PF J	K,E
C44,45			CM73F2H330J	CHIP C 33PF J	K2
C44,45			CM73F2H360J	CHIP C 36PF J	K,E
C44,45			CM73F2H390J	CHIP C 39PF J	K3
C46			C93-0599-05	CHIP C 470PF K	
C48			CK73GB1H471K	CHIP C 470PF K	
C49			CC73GCH1H101J	CHIP C 100PF J	
C50			CK73FB1E104K	CHIP C 0.10UF K	
C51			C90-2143-05	ELECTRO 47UF 25WV	
C52			CC73GCH1H101J	CHIP C 100PF J	
C53			CK73FB1E104K	CHIP C 0.10UF K	
C54			C90-2146-05	ELECTRO 100UF 25WV	
C55			C93-0599-05	CHIP C 470PF K	
C57,58			CM73F2H360J	CHIP C 36PF J	K,K2,E
C57,58			CM73F2H390J	CHIP C 39PF J	K3
C59			C93-0563-05	CHIP C 18PF J	K2
C59			C93-0564-05	CHIP C 22PF J	K,E
C59			C93-0565-05	CHIP C 27PF J	K3
C60			C93-0555-05	CHIP C 5.0PF C	K2
C61			C93-0599-05	CHIP C 470PF K	
C64			CK73FB1H471K	CHIP C 470PF K	
C65,66			CK73GB1H471K	CHIP C 470PF K	
C67			CK73FB1E104K	CHIP C 0.10UF K	
C68			CK73GB1H471K	CHIP C 470PF K	
C69			CC73GCH1H101J	CHIP C 100PF J	
C70			CK73FB1E104K	CHIP C 0.10UF K	
C71,72			CK73GB1H471K	CHIP C 470PF K	
C75			CK73GB1H471K	CHIP C 470PF K	
C77			CC73GCH1H101J	CHIP C 100PF J	
C78			CK73GB1H471K	CHIP C 470PF K	
C79			CK73FB1E104K	CHIP C 0.10UF K	
C80			C92-0777-05	ELECTRO 1000UF 25WV	
C81			C93-0599-05	CHIP C 470PF K	
C83			C93-0555-05	CHIP C 5.0PF C	K2
C83			C93-0556-05	CHIP C 6.0PF D	K,E
C83			C93-0557-05	CHIP C 7.0PF D	K3
C86			C93-0560-05	CHIP C 10PF D	K,K2,E
C86			C93-0561-05	CHIP C 12PF J	K3
C89			C93-0555-05	CHIP C 5.0PF C	K,K2,E
C89			C93-0556-05	CHIP C 6.0PF D	K3
C91-98			CK73GB1H471K	CHIP C 470PF K	

Ref. No.	Address	New parts	Parts No.	Description	Desti-nation
C99			CK73FB1E104K	CHIP C 0.10UF K	
C100-102			CK73GB1H471K	CHIP C 470PF K	
C103			C92-0628-05	CHIP-TAN 10UF 10WV	
C104			CC73GCH1H101J	CHIP C 100PF J	
C105			CK73GB1H471K	CHIP C 470PF K	
C106			CK73FB1E104K	CHIP C 0.10UF K	
C107			CC73GCH1H101J	CHIP C 100PF J	
C108			CK73FB1E104K	CHIP C 0.10UF K	
C109			CC73GCH1H101J	CHIP C 100PF J	
C112			CK73GB1H471K	CHIP C 470PF K	
C113			CK73FB1E104K	CHIP C 0.10UF K	
C114			CK73GB1H471K	CHIP C 470PF K	
C115			CK73FB1E104K	CHIP C 0.10UF K	
C116			CK73GB1H471K	CHIP C 470PF K	
C117			CK73FB1E104K	CHIP C 0.10UF K	
C118			C93-0557-05	CHIP C 7.0PF D	K,E
C118			C93-0560-05	CHIP C 10PF D	K3
C120			CK73FB1H103K	CHIP C 0.010UF K	
CN1,2			E04-0154-05	PIN SOCKET	
CN3			E40-5632-05	PIN ASSY	
CN4			E40-3246-05	PIN ASSY	
CN5			E40-5703-05	PIN ASSY	
CN6-8			E23-0462-05	TERMINAL	
CN51,52			J13-0071-05	FUSE HOLDER	
L1			L40-3963-92	SMALL FIXED INDUCTOR (3.9NH)	
L2			L40-1875-34	SMALL FIXED INDUCTOR (18NH)	K,K2,E
L2			L40-2775-34	SMALL FIXED INDUCTOR (27NH)	K3
L3			L40-4763-92	SMALL FIXED INDUCTOR (4.7NH)	K,K2,E
L3			L40-8265-92	SMALL FIXED INDUCTOR (8.2NH)	K3
L5		*	L34-4602-05	AIR-CORE COIL	
L6,7			L34-4517-05	AIR-CORE COIL	
L8			L40-3975-34	SMALL FIXED INDUCTOR (39NH)	K,K2,E
L8			L40-6875-34	SMALL FIXED INDUCTOR (68NH)	K3
L9			L34-4517-05	AIR-CORE COIL	
L11			L34-4517-05	AIR-CORE COIL	
L12			L34-4523-05	AIR-CORE COIL	
L14,15			L40-1075-34	SMALL FIXED INDUCTOR (10NH)	
R1			RK73GB1J103J	CHIP R 10K J 1/16W	
R2			RK73GB1J472J	CHIP R 4.7K J 1/16W	
R3			RK73GB1J470J	CHIP R 47 J 1/16W	
R4			RK73GB1J100J	CHIP R 10 J 1/16W	
R6			RK73GB1J100J	CHIP R 10 J 1/16W	
R7			RK73GB1J682J	CHIP R 6.8K J 1/16W	
R8			RK73FB2A100J	CHIP R 10 J 1/10W	
R9			RK73FB2A220J	CHIP R 22 J 1/10W	
R11			RK73GB1J333J	CHIP R 33K J 1/16W	
R12			RK73GB1J153J	CHIP R 15K J 1/16W	
R13			RK73FB2A220J	CHIP R 22 J 1/10W	
R14			R92-0365-05	CHIP R 1.0K J 1/2W	K3
R15			R92-1211-05	CHIP R 5.6 J 1/2W	K3
R15			R92-1217-05	CHIP R 0 OHM	K,K2,E
R16			R92-0365-05	CHIP R 1.0K J 1/2W	K3
R17			RK73FB2A473J	CHIP R 47K J 1/10W	
R18			RK73EB2B100J	CHIP R 10 J 1/8W	
R19			RK73FB2A683J	CHIP R 68K J 1/10W	
R20,21			R92-1252-05	CHIP R 0 OHM	
R22			R92-1215-05	CHIP R 470 J 1/2W	
R23			RK73FB2A473J	CHIP R 47K J 1/10W	

PARTS LIST

FINAL UNIT (X45-3630-XX)
DISPLAY UNIT (X54-3330-20)

Ref. No.	Address	New parts	Parts No.	Description	Desti-nation
R24			RK73FB2A563J	CHIP R 56K J 1/10W	
R26			RK73GB1J101J	CHIP R 100 J 1/16W	
R33			R92-0670-05	CHIP R 0 OHM	
R34,35			RK73GB1J104J	CHIP R 100K J 1/16W	
R36			R92-1252-05	CHIP R 0 OHM	
R37			R92-0670-05	CHIP R 0 OHM	
R38			RK73GB1J473J	CHIP R 47K J 1/16W	
R40			RK73FB2A101J	CHIP R 100 J 1/10W	
R41			R92-1252-05	CHIP R 0 OHM	
R43			RK73FB2A101J	CHIP R 100 J 1/10W	
R44			R92-0670-05	CHIP R 0 OHM	
R45			RK73GB1J102J	CHIP R 1.0K J 1/16W	
R46			R92-1252-05	CHIP R 0 OHM	
R47			RK73GB1J332J	CHIP R 3.3K J 1/16W	
R48			RK73GB1J471J	CHIP R 470 J 1/16W	
R49			R92-1217-05	CHIP R 0 OHM	
R50			R92-1317-05	CHIP R 18 J 1W	
R51			RK73GB1J104J	CHIP R 100K J 1/16W	
R52			RK73GB1J393J	CHIP R 39K J 1/16W	
R53			RK73GB1J154J	CHIP R 150K J 1/16W	
R54			RK73GB1J102J	CHIP R 1.0K J 1/16W	
R55			RK73GB1J474J	CHIP R 470K J 1/16W	
R56			RK73GB1J473J	CHIP R 47K J 1/16W	
R57			RK73GB1J471J	CHIP R 470 J 1/16W	
R58			RK73GB1J222J	CHIP R 2.2K J 1/16W	
R59			RK73GB1J471J	CHIP R 470 J 1/16W	
R60			RK73GB1J104J	CHIP R 100K J 1/16W	
R61		*	R92-2687-05	RESISTOR 5.6 5W	
R62			RK73GB1J471J	CHIP R 470 J 1/16W	
VR1			R12-6427-05	TRIMMING POT. (47K)	
K1		*	S76-0426-05	RELAY	
D2			02DZ5.1(Y)	ZENER DIODE	
D3			1SS355	DIODE	
D4,5			HSM88AS	DIODE	
D7			ZSA5A27	ZENER DIODE	
D8			RB051L-40	DIODE	
D9			MINISMDC050-02	VARISTOR	
D10			1SS355	DIODE	
D51,52			DSA3A1	DIODE	
IC1		*	TK11050M	ANALOG IC	
IC2			NJM78L05UA	BI-POLAR IC	
IC3			TA75W01FU	MOS IC	
Q1			2SC5110(O)	TRANSISTOR	
Q2			2SC3356(R24)	TRANSISTOR	
Q3			2SK2596	FET	
Q4			2SK3075	FET	
Q5		*	2SK3478-21	FET	K2
Q5		*	2SK3478-22	FET	K,K3,E
Q7			2SK1824	FET	
Q8			2SC4116(Y)	TRANSISTOR	
Q9			DTD123EK	DIGITAL TRANSISTOR	
TH1			PTH9M04BE471TS	THERMISTOR	
DISPLAY UNIT (X54-3330-20)					
D503-505			B30-2151-05	LED (RED/GREEN)	
C501			C92-0628-05	CHIP-TAN 10UF 10WV	
C502,503			C92-0501-05	CHIP-TAN 1.5UF 10WV	
C504,505			CK73GB1C104K	CHIP C 0.10UF K	
C506			CC73GCH1H470J	CHIP C 47PF J	
C507,508			CK73GB1C104K	CHIP C 0.10UF K	
C509			CK73GB1H103K	CHIP C 0.010UF K	
C510			C92-0628-05	CHIP-TAN 10UF 10WV	
C511,512			CK73GB1E103K	CHIP C 0.010UF K	
C513-518			CC73GCH1H101J	CHIP C 100PF J	
C519,520			CK73GB1E103K	CHIP C 0.010UF K	
C521			C92-0628-05	CHIP-TAN 10UF 10WV	
C522			CK73GB1C104K	CHIP C 0.10UF K	
C523		*	CK73FB1E334K	CHIP C 0.33UF K	
C524			C92-0628-05	CHIP-TAN 10UF 10WV	
C525			CK73GB1C104K	CHIP C 0.10UF K	
C526		*	CK73FB1E334K	CHIP C 0.33UF K	
C601			CC73GCH1H101J	CHIP C 100PF J	
C602			CK73GB1H102K	CHIP C 1000PF K	
C603			CC73GCH1H101J	CHIP C 100PF J	
C606			CC73GCH1H101J	CHIP C 100PF J	
C607			CK73GB1C104K	CHIP C 0.10UF K	
CN501		*	E40-6140-05	PIN ASSY	
CN502		*	E40-6102-05	PIN ASSY	
CN601		*	E40-6141-05	PIN ASSY	
J601			E08-0877-05	MODULAR JACK	
-			J31-0543-05	COLLAR (LH-5-1.5)	
CP501-504			RK75GB1J471J	CHIP-COM 470 J 1/16W	
R502,503			R92-1252-05	CHIP R 0 OHM	
R505			RK73GB1J683J	CHIP R 68K J 1/16W	
R506			RK73GB1J103J	CHIP R 10K J 1/16W	
R507			RK73GB1J682J	CHIP R 6.8K J 1/16W	
R508			RK73GB1J102J	CHIP R 1.0K J 1/16W	
R509			RK73GB1J103J	CHIP R 10K J 1/16W	
R510			RK73GB1J224J	CHIP R 220K J 1/16W	
R511,512			RK73GB1J103J	CHIP R 10K J 1/16W	
R513			RK73GB1J104J	CHIP R 100K J 1/16W	
R514			RK73GB1J154J	CHIP R 150K J 1/16W	
R516			R92-2565-05	CHIP R 1.2K D 1/2W	
R517			R92-2023-05	CHIP R 820 J 1/2W	
R519			R92-2565-05	DHIP R 1.2K D 1/2W	
R520-526			R92-2023-05	CHIP R 820 J 1/2W	
R529-540			RK73GB1J102J	CHIP R 1.0K J 1/16W	
R541-544			RK73GB1J103J	CHIP R 10K J 1/16W	
R601			RK73GB1J681J	CHIP R 680 J 1/16W	
R604,605			RK73GB1J102J	CHIP R 1.0K J 1/16W	
R606			RK73GB1J473J	CHIP R 47K J 1/16W	
VR501			R32-0643-05	SEMI FIXED VARIABLE RESISTOR	
VR601			R31-0630-05	VARIABLE RESISTOR	
S501-506			S70-0410-15	TACT SWITCH	
S507			S68-0410-05	PUSH SWITCH	
D501,502			HSM88AS	DIODE	
D506,507		*	LA-501DD	LED	
D508-514			DA204U	DIODE	
D601,602			DA204U	DIODE	
D603		*	MINISMD020	VARISTOR	
IC501			NJM4558E	MOS IC	
IC502-505			BU4094BCFV	MOS IC	
IC506,507			TA78L05F	MOS IC	
Q501			2SC4116(Y)	TRANSISTOR	

PARTS LIST

DISPLAY UNIT (X54-3330-20)
TX-RX UNIT (X57-6270-XX)

Ref. No.	Address	New parts	Parts No.	Description	Desti- nation
Q502			2SA1586(Y,GR)	TRANSISTOR	
Q504			UPA672T	FET	
Q506			DTA114EUA	DIGITAL TRANSISTOR	
Q507			UPA672T	FET	
Q508			DTA114EUA	DIGITAL TRANSISTOR	
Q510,511			DTA114EUA	DIGITAL TRANSISTOR	
Q512-514			UPA672T	FET	
Q516-519			UPA672T	FET	
Q521-524			UPA672T	FET	
Q525			2SK1824	FET	

TX-RX UNIT (X57-6270-XX) -10 : K,E -11 : K2 -12 : K3

Ref. No.	Address	New parts	Parts No.	Description	Desti- nation
C1			CC73GCH1H030C	CHIP C 3.0PF C	K3
C2			CC73GCH1H010C	CHIP C 1.0PF C	K3
C2			CC73GCH1H040C	CHIP C 4.0PF C	K2
C3			CC73GCH1H060D	CHIP C 6.0PF D	K3
C3			CC73GCH1H070D	CHIP C 7.0PF D	K2
C3			CC73GCH1H180J	CHIP C 18PF J	K,E
C4,5			CK73GB1H471K	CHIP C 470PF K	
C7			CC73GCH1H050C	CHIP C 5.0PF C	K,K2,E
C7			CC73GCH1H070D	CHIP C 7.0PF D	K3
C8			CC73GCH1H060D	CHIP C 6.0PF D	K3
C10			CC73GCH1H040C	CHIP C 4.0PF C	K3
C13			CK73GB1H471K	CHIP C 470PF K	
C14,15			CC73GCH1H060D	CHIP C 6.0PF D	K,K2,E
C14,15			CC73GCH1H070D	CHIP C 7.0PF D	K3
C24			C92-0519-05	CHIP-TAN 1.0UF 25WV	
C25			C92-0628-05	CHIP-TAN 10UF 10WV	
C28			CC73GCH1H080D	CHIP C 8.0PF D	K3
C28,29			CC73GCH1H020C	CHIP C 2.0PF C	K,K2,E
C29			CC73GCH1H110J	CHIP C 11PF J	K3
C30			CC73GCH1H680J	CHIP C 68PF J	
C31			CC73GCH1H331J	CHIP C 330PF J	
C32			CK73GB1H103K	CHIP C 0.010UF K	
C33			CC73GCH1H330J	CHIP C 33PF J	
C34			CK73GB1H103K	CHIP C 0.010UF K	
C36,37			CK73GB1H103K	CHIP C 0.010UF K	
C38,39			CC73GCH1H680J	CHIP C 68PF J	
C40,41			CK73GB1H103K	CHIP C 0.010UF K	
C42,43			CC73GCH1H030C	CHIP C 3.0PF C	
C44,45			CC73GCH1H040C	CHIP C 4.0PF C	
C46,47			CC73GCH1H030C	CHIP C 3.0PF C	
C48			CK73GB1H103K	CHIP C 0.010UF K	
C49,50			CC73GCH1H680J	CHIP C 68PF J	
C51			CK73GB1H103K	CHIP C 0.010UF K	
C52			CK73GB1H103J	CHIP C 0.010UF J	
C53			CK73GB1H102K	CHIP C 1000PF K	
C54			CK73GB1H103J	CHIP C 0.010UF J	
C55,56			CK73GB1H103K	CHIP C 0.010UF K	
C57			CK73GB1H103J	CHIP C 0.010UF J	
C58			CC73GCH1H180J	CHIP C 18PF J	
C59			CC73GCH1H150J	CHIP C 15PF J	
C60			CK73GB1H103K	CHIP C 0.010UF K	
C61			CC73GCH1H080D	CHIP C 8.0PF D	
C62,63			CK73GB1H103K	CHIP C 0.010UF K	
C64			CK73GB1C104K	CHIP C 0.10UF K	
C65			C92-0628-05	CHIP-TAN 10UF 10WV	
C66,67			CC73GCH1H221J	CHIP C 220PF J	K,K2,E
C66,67			CC73GCH1H331J	CHIP C 330PF J	K3
C68-70			CK73GB1C104K	CHIP C 0.10UF K	
C71			CK73GB1H103K	CHIP C 0.010UF K	
C72			C92-0628-05	CHIP-TAN 10UF 10WV	
C73			CK73GB1C104K	CHIP C 0.10UF K	K3
C73,74			CK73GB1H102K	CHIP C 1000PF K	K,K2,E
C74			CK73GB1H102K	CHIP C 1000PF K	K3
C75			CK73GB1C104K	CHIP C 0.10UF K	K3
C75			CK73GB1C223K	CHIP C 0.022UF K	K,K2,E
C76			C92-0628-05	CHIP-TAN 10UF 10WV	
C77			CK73GB1H102K	CHIP C 1000PF K	
C78			CK73GB1C104K	CHIP C 0.10UF K	K3
C78			CK73GB1C223K	CHIP C 0.022UF K	K,K2,E
C79			CK73FB1C224K	CHIP C 0.22UF K	K3
C79			CK73FB1C334K	CHIP C 0.33UF K	K,K2,E
C80,81			C92-0628-05	CHIP-TAN 10UF 10WV	
C82-84			CK73GB1H103K	CHIP C 0.010UF K	
C85			C92-0628-05	CHIP-TAN 10UF 10WV	
C86			CK73GB1H102K	CHIP C 1000PF K	
C87			C92-0628-05	CHIP-TAN 10UF 10WV	
C88			CK73GB1H102K	CHIP C 1000PF K	
C89,90			CK73GB1H103J	CHIP C 0.010UF J	
C91			CC73GCH1H040C	CHIP C 4.0PF C	K,K2,E
C91			CC73GCH1H050C	CHIP C 5.0PF C	K3
C92,93			CK73GB1H471K	CHIP C 470PF K	
C94			CC73GCH1H030C	CHIP C 3.0PF C	K,K2,E
C94,95			CC73GCH1H040C	CHIP C 4.0PF C	K3
C95			CC73GCH1H040C	CHIP C 4.0PF C	K,E
C95			CC73GCH1H060D	CHIP C 6.0PF D	K2
C96-99			CK73GB1H471K	CHIP C 470PF K	
C100			CC73GCH1H060D	CHIP C 6.0PF D	K3
C100,101			CC73GCH1H050C	CHIP C 5.0PF C	K,K2,E
C101			CC73GCH1H050C	CHIP C 5.0PF C	K3
C102			CK73GB1H471K	CHIP C 470PF K	
C104			CK73GB1H471K	CHIP C 470PF K	
C105			CC73GCH1H070D	CHIP C 7.0PF D	
C106			CK73GB1H471K	CHIP C 470PF K	
C107			CC73GCH1H060D	CHIP C 6.0PF D	
C109			CC73GCH1H120J	CHIP C 12PF J	
C111			CC73GCH1H060D	CHIP C 6.0PF D	
C114-117			CC73GCH1H100D	CHIP C 10PF D	
C120,121			CK73GB1H471K	CHIP C 470PF K	
C122,123			CK73GB1H103K	CHIP C 0.010UF K	
C124,125			C92-1341-05	ELECTRO 100UF 16WV	
C126,127			C92-0633-05	CHIP-TAN 22UF 10WV	
C128,129			CK73GB1H103K	CHIP C 0.010UF K	
C130,131			CK73GB1H102K	CHIP C 1000PF K	
C132,133			CK73GB1H471K	CHIP C 470PF K	
C134,135			CK73GB1H103K	CHIP C 0.010UF K	
C136-139			C90-4016-05	ELECTRO 47UF 16WV	
C140,141			CK73GB1H103K	CHIP C 0.010UF K	
C142,143			CK73GB1H102K	CHIP C 1000PF K	
C144			CK73GB1H471K	CHIP C 470PF K	
C145			C92-0606-05	CHIP-TAN 4.7UF 10WV	
C146			CK73GB1H471K	CHIP C 470PF K	
C147			C92-0633-05	CHIP-TAN 22UF 10WV	
C148			CK73GB1H102K	CHIP C 1000PF K	
C149			CK73GB1H103K	CHIP C 0.010UF K	
C150			C92-0633-05	CHIP-TAN 22UF 10WV	
C151			C92-0008-05	CHIP-TAN 3.3UF 16WV	

PARTS LIST

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Ref. No.	Address	New parts	Parts No.	Description	Desti-nation
C152			CK73GB1H103K	CHIP C 0.010UF K	
C153			CK73GB1H471K	CHIP C 470PF K	
C154			C92-0560-05	CHIP-TAN 10UF 6.3WV	
C155			CK73GB1H103K	CHIP C 0.010UF K	
C156			CK73GB1H102K	CHIP C 1000PF K	
C157			CK73GB1H103K	CHIP C 0.010UF K	
C158			C92-0008-05	CHIP-TAN 3.3UF 16WV	
C159			CK73GB1H471K	CHIP C 470PF K	
C160			CK73GB1H102K	CHIP C 1000PF K	
C161-163			CK73GB1H103K	CHIP C 0.010UF K	
C164			CK73GB1H471K	CHIP C 470PF K	
C166,167			CK73GB1H471K	CHIP C 470PF K	
C171			CK73GB1H471K	CHIP C 470PF K	
C172			CK73GB1H102K	CHIP C 1000PF K	
C173			CK73GB1H103K	CHIP C 0.010UF K	
C174			C92-0008-05	CHIP-TAN 3.3UF 16WV	
C175			CK73GB1H102K	CHIP C 1000PF K	
C176			CK73GB1H103K	CHIP C 0.010UF K	
C177			CK73GB1H471K	CHIP C 470PF K	
C178			C92-0606-05	CHIP-TAN 4.7UF 10WV	
C179			CK73GB1H103K	CHIP C 0.010UF K	
C184,185			CK73GB1H102K	CHIP C 1000PF K	
C189,190			CK73GB1H102K	CHIP C 1000PF K	
C191-195			CK73GB1H103K	CHIP C 0.010UF K	
C196			CK73GB1H472K	CHIP C 4700PF K	K,K2,E
C197			CK73FB1H333K	CHIP C 0.033UF K	
C198			CK73GB1C104K	CHIP C 0.10UF K	
C199			CK73GB1H103K	CHIP C 0.010UF K	
C204-208			CC73GCH1H101J	CHIP C 100PF J	
C209-211			CC73GCH1H100D	CHIP C 10PF D	K,E
C209,210			CC73GCH1H100D	CHIP C 10PF D	K2
C211			CC73GCH1H101J	CHIP C 100PF J	K2
C212-214			CK73GB1H103K	CHIP C 0.010UF K	
C215			CC73GCH1H050C	CHIP C 5.0PF C	K3
C216			CK73GB1H471K	CHIP C 470PF K	K3
C217			CK73GB1H102K	CHIP C 1000PF K	K3
C218			CK73GB1H103K	CHIP C 0.010UF K	K3
C223			CC73GCH1H101J	CHIP C 100PF J	K,E
C224			CC73GCH1H030C	CHIP C 3.0PF C	K3
C230			CC73GCH1H101J	CHIP C 100PF J	K3
C600			CK73GB1C104K	CHIP C 0.10UF K	
C602			CK73GB1C104K	CHIP C 0.10UF K	
C605			CK73GB1C104K	CHIP C 0.10UF K	
C613,614			CK73GB1E103K	CHIP C 0.010UF K	
C616			CK73GB1E103K	CHIP C 0.010UF K	
C623			CK73GB1C104K	CHIP C 0.10UF K	
C629			CC73GCH1H101J	CHIP C 100PF J	
C634,635			CC73GCH1H220J	CHIP C 22PF J	
C638			CK73GB1C104K	CHIP C 0.10UF K	
C639			CK73GB1E103K	CHIP C 0.010UF K	
C640			C92-0628-05	CHIP-TAN 10UF 10WV	
C641			CK73GB1C104K	CHIP C 0.10UF K	
C642			CK73GB1E103K	CHIP C 0.010UF K	
C643			C92-0628-05	CHIP-TAN 10UF 10WV	
C644			CK73GB1E103K	CHIP C 0.010UF K	
C645,646			C92-0628-05	CHIP-TAN 10UF 10WV	
C647			CC73GCH1H101J	CHIP C 100PF J	
C648			CK73GB1E103K	CHIP C 0.010UF K	
C649			CC73GCH1H330J	CHIP C 33PF J	
C652			CC73GCH1H101J	CHIP C 100PF J	
C657			CK73GB1E103K	CHIP C 0.010UF K	
C662			C92-0628-05	CHIP-TAN 10UF 10WV	
C663			C92-0519-05	CHIP-TAN 1.0UF 25WV	
C670			C92-0003-05	CHIP-TAN 0.47UF 25WV	
C679,680			C92-0628-05	CHIP-TAN 10UF 10WV	
C681			C92-0546-05	CHIP-TAN 68UF 6.3WV	
C684			CC73GCH1H101J	CHIP C 100PF J	
C685			CK73GB1E103K	CHIP C 0.010UF K	
C690			CC73GCH1H101J	CHIP C 100PF J	
C691,692			CK73GB1E103K	CHIP C 0.010UF K	
C693,694			C92-0628-05	CHIP-TAN 10UF 10WV	
C695,696			CK73GB1H471K	CHIP C 470PF K	
C697-702			C92-0628-05	CHIP-TAN 10UF 10WV	
C703,704			CK73GB1C104K	CHIP C 0.10UF K	
C705			CK73GB1E103K	CHIP C 0.010UF K	
C706			C92-0628-05	CHIP-TAN 10UF 10WV	
C707-709			CK73GB1E103K	CHIP C 0.010UF K	
C710			C92-0628-05	CHIP-TAN 10UF 10WV	
C711			CK73GB1H471K	CHIP C 470PF K	
C712			CK73GB1E103K	CHIP C 0.010UF K	
C713,714			C92-0628-05	CHIP-TAN 10UF 10WV	
C715			CK73GB1E103K	CHIP C 0.010UF K	
C716,717			CK73GB1H471K	CHIP C 470PF K	
C718,719			CK73GB1E103K	CHIP C 0.010UF K	
C720-722			C92-0628-05	CHIP-TAN 10UF 10WV	
C723			CK73FB1C105K	CHIP C 1.0UF K	
C724			CK73GB1H182K	CHIP C 1800PF K	
C725			CC73GCH1H470J	CHIP C 47PF J	
C726			CC73GCH1H181J	CHIP C 180PF J	
C727,728			CK73GB1E103K	CHIP C 0.010UF K	
C729			C92-0628-05	CHIP-TAN 10UF 10WV	
C730,731			CK73GB1E103K	CHIP C 0.010UF K	
C732			CK73GB1H471K	CHIP C 470PF K	
C733			C92-0628-05	CHIP-TAN 10UF 10WV	
C734			CC73GCH1H270J	CHIP C 27PF J	
C735			CC73GCH1H150J	CHIP C 15PF J	
C736			CK73GB1H182K	CHIP C 1800PF K	
C737			CC73GCH1H270J	CHIP C 27PF J	
C738			CK73GB1E103K	CHIP C 0.010UF K	
C739			CC73GCH1H181J	CHIP C 180PF J	
C740			CC73GCH1H101J	CHIP C 100PF J	
C741			CK73GB1E103K	CHIP C 0.010UF K	
C742			CK73GB1H471K	CHIP C 470PF K	
C743			CK73GB1E103K	CHIP C 0.010UF K	
C744-746			C92-0628-05	CHIP-TAN 10UF 10WV	
C747,748			CK73GB1E103K	CHIP C 0.010UF K	
C749			CK73GB1H471K	CHIP C 470PF K	
C750,751			CK73GB1E103K	CHIP C 0.010UF K	
C752			CK73GB1H471K	CHIP C 470PF K	
C753,754			C92-0628-05	CHIP-TAN 10UF 10WV	
C755			CK73GB1H471K	CHIP C 470PF K	
C756,757			C92-0628-05	CHIP-TAN 10UF 10WV	
C758			CK73FB1C105K	CHIP C 1.0UF K	
C759			CK73GB1H471K	CHIP C 470PF K	
C760			CK73GB1H102K	CHIP C 1000PF K	
C761			CK73GB1C104K	CHIP C 0.10UF K	
C762,763			CK73GB1H102K	CHIP C 1000PF K	
C764,765			CK73GB1E103K	CHIP C 0.010UF K	
C766-768			CC73GCH1H101J	CHIP C 100PF J	
C769-771			C92-0560-05	CHIP-TAN 10UF 6.3WV	

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Ref. No.	Address	New parts	Parts No.	Description	Desti-nation
C772			C92-0633-05	CHIP-TAN 22UF 10WV	
C773			C92-0514-05	CHIP-TAN 2.2UF 10WV	
C774			CK73FB1C105K	CHIP C 1.0UF K	
C775-779			C92-0519-05	CHIP-TAN 1.0UF 25WV	
C780-782			CK73FB1C105K	CHIP C 1.0UF K	
C783			CK73GB1H471K	CHIP C 470PF K	
C784			CK73FB1C105K	CHIP C 1.0UF K	
C785,786			CK73GB1C104K	CHIP C 0.10UF K	
C787			CK73FB1C105K	CHIP C 1.0UF K	
C788			CC73GCH1H101J	CHIP C 100PF J	
C789			CE04EW1E331M	ELECTRO 330UF 25WV	
C790			CC73GCH1H101J	CHIP C 100PF J	
C791			CK73GB1H471K	CHIP C 470PF K	
C792-794			CK73GB1H102K	CHIP C 1000PF K	
C795			CC73GCH1H101J	CHIP C 100PF J	
C796,797			CK73GB1H102K	CHIP C 1000PF K	
C798			CE04EW1E470M	ELECTRO 47UF 25WV	
C799			CK73GB1H102K	CHIP C 1000PF K	
C800			CE04EW1E470M	ELECTRO 47UF 25WV	
C801			C92-0560-05	CHIP-TAN 10UF 6.3WV	
C802-805			CK73GB1H102K	CHIP C 1000PF K	
C806			CE04EW1E470M	ELECTRO 47UF 25WV	
C807-810			CK73GB1H102K	CHIP C 1000PF K	
C811			CE04EW1E470M	ELECTRO 47UF 25WV	
C812,813			CK73GB1H102K	CHIP C 1000PF K	
C814			C92-0777-05	ELECTRO 1000UF 25WV	
C815			CK73FB1E104K	CHIP C 0.10UF K	
C816			CK73GB1H102K	CHIP C 1000PF K	
C817			CE04EW1E470M	ELECTRO 47UF 25WV	
C818-820			CK73GB1H102K	CHIP C 1000PF K	
C821,822			CC73GCH1H101J	CHIP C 100PF J	
C823			C92-0619-05	CHIP-TAN 47UF 4WV	
C824			CK73GB1H472K	CHIP C 4700PF K	
C825			CK73GB1C104K	CHIP C 0.10UF K	
C826			C92-0560-05	CHIP-TAN 10UF 6.3WV	
C827			C92-0633-05	CHIP-TAN 22UF 10WV	
C828			C92-0514-05	CHIP-TAN 2.2UF 10WV	
CN1			E04-0154-05	PIN SOCKET	
CN2			E40-5538-05	PIN ASSY	
CN3			E04-0154-05	PIN SOCKET	
CN4			E40-5538-05	PIN ASSY	
CN14			E40-6009-05	FLAT CABLE CONNECTOR	
CN15			E40-5703-05	PIN ASSY	
CN16			E40-5632-05	PIN ASSY	
CN18,19			E04-0154-05	PIN SOCKET	
CN600		✻	E40-6102-05	PIN ASSY	
CN601			E40-5701-05	PIN ASSY	
CN602			E40-6009-05	FLAT CABLE CONNECTOR	
CN603			E40-5887-05	PIN ASSY	
CN604			E40-5702-05	PIN ASSY	
CN605			E40-5704-05	PIN ASSY	
CN606			E40-5960-05	PIN ASSY	
F1			F53-0217-05	FUSE	
CF1			L72-0366-05	CERAMIC FILTER	
CF2			L72-0376-05	CERAMIC FILTER	
L1			L34-4616-05	AIR-CORE COIL	
L2		✻	L79-1771-05	HELICAL BLOCK	K,E
L2		✻	L79-1772-05	HELICAL BLOCK	K2
L2		✻	L79-1782-05	HELICAL BLOCK	K3
L3			L40-1575-34	SMALL FIXED INDUCTOR (15NH)	K2
L3			L40-1875-34	SMALL FIXED INDUCTOR (18NH)	K,E
L3			L40-2275-34	SMALL FIXED INDUCTOR (22NH)	K3
L4,5		✻	L79-1771-05	HELICAL BLOCK	K,E
L4,5		✻	L79-1772-05	HELICAL BLOCK	K2
L4,5		✻	L79-1782-05	HELICAL BLOCK	K3
L6			L40-1075-34	SMALL FIXED INDUCTOR (10NH)	K2
L6			L40-1271-34	SMALL FIXED INDUCTOR (12NH)	K3
L10			L40-1581-37	SMALL FIXED INDUCTOR (0.150UH)	
L11			L40-1885-34	SMALL FIXED INDUCTOR (180NH)	
L12			L40-3381-37	SMALL FIXED INDUCTOR (0.330UH)	
L13			L40-1005-34	SMALL FIXED INDUCTOR (10UH)	
L14			L34-4527-05	COIL	
L15			L34-4526-05	COIL	
L16			L34-4527-05	COIL	
L17,18			L34-4526-05	COIL	
L19			L34-4527-05	COIL	
L20			L40-1095-34	SMALL FIXED INDUCTOR (1UH)	
L21			L40-1005-34	SMALL FIXED INDUCTOR (10UH)	
L23			L40-1095-34	SMALL FIXED INDUCTOR (1UH)	
L24			L34-4530-05	COIL	
L25			L40-2775-34	SMALL FIXED INDUCTOR (27NH)	
L26			L40-1575-34	SMALL FIXED INDUCTOR (15NH)	K,K2,E
L26-28			L40-2275-34	SMALL FIXED INDUCTOR (22NH)	K3
L27			L40-2275-34	SMALL FIXED INDUCTOR (22NH)	K,E
L27,28			L40-1875-34	SMALL FIXED INDUCTOR (18NH)	K2
L28			L40-1875-34	SMALL FIXED INDUCTOR (18NH)	K,E
L29,30			L40-1875-92	SMALL FIXED INDUCTOR (18NH)	K,K2,E
L29,30			L40-2275-92	SMALL FIXED INDUCTOR (22NH)	K3
L31,32			L40-1005-34	SMALL FIXED INDUCTOR (10UH)	
L33			L40-1575-92	SMALL FIXED INDUCTOR (15NH)	
L34			L40-1005-34	SMALL FIXED INDUCTOR (10UH)	
L35-39			L92-0140-05	FERRITE CHIP	
L40			L92-0158-05	FERRITE CHIP	
L41			L92-0140-05	FERRITE CHIP	
L42			L40-1875-92	SMALL FIXED INDUCTOR (18NH)	K3
L42			L40-6865-92	SMALL FIXED INDUCTOR (6.8NH)	K,K2,E
L43			L92-0140-05	FERRITE CHIP	K3
L45			L40-1875-92	SMALL FIXED INDUCTOR (18NH)	K3
L600-613			L92-0140-05	FERRITE CHIP	
X1			L77-1762-05	CRYSTAL RESONATOR (44.395MHZ)	
X2,3		✻	L77-1849-05	VCXO (16.8MHZ)	
X600			L78-0431-05	RESONATOR (14.7456M)	
X601			L77-1799-05	CRYSTAL RESONATOR (16.515MHZ)	
XF1			L71-0513-05	MCF (44.85MHZ NARR)	
XF2			L71-0512-05	MCF (44.85MHZ WIDE)	
CP600,601			R90-0725-05	MULTI-COMP 1K X2	
CP602			R90-0724-05	MULTI-COMP 1K X4	
CP603			R90-1019-05	MULTI-COMP 100 X2	
CP604,605			R90-0725-05	MULTI-COMP 1K X2	
CP606			R90-0719-05	MULTI-COMP 4.7K X2	
CP607,608			R90-0725-05	MULTI-COMP 1K X2	
CP609			R90-1019-05	MULTI-COMP 100 X2	
CP610,611			R90-0750-05	MULTIPLE RESISTOR	
CP612-614			R90-0725-05	MULTI-COMP 1K X2	
CP615-619			R90-0750-05	MULTIPLE RESISTOR	
R1			R92-0670-05	CHIP R 0 OHM	K,E
R2			RK73GB1J122J	CHIP R 1.2K J 1/16W	

PARTS LIST

TX-RX UNIT (X57-6270-XX)

Ref. No.	Address	New parts	Parts No.	Description	Desti-nation
R3			RK73GB1J102J	CHIP R 1.0K J 1/16W	
R5			RK73GB1J101J	CHIP R 100 J 1/16W	
R8			RK73GB1J151J	CHIP R 150 J 1/16W	
R9			RK73GB1J223J	CHIP R 22K J 1/16W	
R10			RK73GB1J180J	CHIP R 18 J 1/16W	
R11			RK73GB1J271J	CHIP R 270 J 1/16W	
R13			RK73GB1J271J	CHIP R 270 J 1/16W	
R14			RK73GB1J333J	CHIP R 33K J 1/16W	
R17			RK73GB1J824J	CHIP R 820K J 1/16W	
R18			RK73GB1J684J	CHIP R 680K J 1/16W	
R19			RK73GB1J474J	CHIP R 470K J 1/16W	
R20			RK73GB1J224J	CHIP R 220K J 1/16W	
R30			RK73GB1J821J	CHIP R 820 J 1/16W	
R31			RK73GB1J5R6J	CHIP R 5.6 J 1/16W	
R32			RK73GB1J821J	CHIP R 820 J 1/16W	
R33			RK73GB1J470J	CHIP R 47 J 1/16W	
R34			RK73GB1J102J	CHIP R 1.0K J 1/16W	
R35			RK73GB1J182J	CHIP R 1.8K J 1/16W	
R36			RK73GB1J102J	CHIP R 1.0K J 1/16W	
R37			RK73GB1J682J	CHIP R 6.8K J 1/16W	
R38			R92-1252-05	CHIP R 0 OHM	
R39			RK73GB1J560J	CHIP R 56 J 1/16W	
R40			RK73GB1J270J	CHIP R 27 J 1/16W	
R41			RK73GB1J222J	CHIP R 2.2K J 1/16W	
R42-45			RK73GB1J223J	CHIP R 22K J 1/16W	
R46			RK73GB1J222J	CHIP R 2.2K J 1/16W	
R47			RK73GB1J153J	CHIP R 15K J 1/16W	
R48			RK73GB1J473J	CHIP R 47K J 1/16W	
R49			RK73GB1J221J	CHIP R 220 J 1/16W	
R50			RK73GB1J153J	CHIP R 15K J 1/16W	
R51			R92-1252-05	CHIP R 0 OHM	
R52			RK73GB1J223J	CHIP R 22K J 1/16W	
R53			RK73GB1J682J	CHIP R 6.8K J 1/16W	
R54			RK73GB1J102J	CHIP R 1.0K J 1/16W	
R55			RK73GB1J223J	CHIP R 22K J 1/16W	
R56			RK73GB1J682J	CHIP R 6.8K J 1/16W	
R57			RK73GB1J182J	CHIP R 1.8K J 1/16W	K,K2,E
R57			RK73GB1J332J	CHIP R 3.3K J 1/16W	K3
R58			RK73GB1J153J	CHIP R 15K J 1/16W	
R59			RK73GB1J223J	CHIP R 22K J 1/16W	K,K2,E
R60			RK73GB1J103J	CHIP R 10K J 1/16W	
R61			RK73GB1J274J	CHIP R 270K J 1/16W	
R62			RK73GB1J222J	CHIP R 2.2K J 1/16W	
R63			RK73GB1J183J	CHIP R 18K J 1/16W	
R64			RK73GB1J220J	CHIP R 22 J 1/16W	K,K2,E
R65			RK73GB1J392J	CHIP R 3.9K J 1/16W	K3
R65			RK73GB1J472J	CHIP R 4.7K J 1/16W	K,K2,E
R66			RK73GB1J334J	CHIP R 330K J 1/16W	
R67			RK73GB1J102J	CHIP R 1.0K J 1/16W	K,K2,E
R67			RK73GB1J560J	CHIP R 56 J 1/16W	K3
R68			RK73GB1J332J	CHIP R 3.3K J 1/16W	
R69			RK73GB1J392J	CHIP R 3.9K J 1/16W	
R70			RK73GB1J102J	CHIP R 1.0K J 1/16W	K3
R71			RK73GB1J104J	CHIP R 100K J 1/16W	K,K2,E
R71			RK73GB1J823J	CHIP R 82K J 1/16W	K3
R72			RK73GB1J334J	CHIP R 330K J 1/16W	K3
R72			RK73GB1J393J	CHIP R 39K J 1/16W	K,K2,E
R73			RK73GB1J474J	CHIP R 470K J 1/16W	
R74,75			RK73GB1J220J	CHIP R 22 J 1/16W	
R76			RK73GB1J104J	CHIP R 100K J 1/16W	
R77,78			RK73GB1J473J	CHIP R 47K J 1/16W	
R79			RK73GB1J104J	CHIP R 100K J 1/16W	
R82			RK73GB1J474J	CHIP R 470K J 1/16W	
R83			R92-1252-05	CHIP R 0 OHM	
R87,88			RK73GB1J102J	CHIP R 1.0K J 1/16W	
R90			R92-1252-05	CHIP R 0 OHM	
R91			RK73GB1J472J	CHIP R 4.7K J 1/16W	
R92			RK73GB1J182J	CHIP R 1.8K J 1/16W	
R93			RK73GB1J101J	CHIP R 100 J 1/16W	K2
R93,94			RK73GB1J101J	CHIP R 100 J 1/16W	K,K3,E
R94			RK73GB1J820J	CHIP R 82 J 1/16W	K2
R95			RK73GB1J472J	CHIP R 4.7K J 1/16W	
R96			RK73GB1J182J	CHIP R 1.8K J 1/16W	
R97			RK73GB1J332J	CHIP R 3.3K J 1/16W	
R98			RK73GB1J102J	CHIP R 1.0K J 1/16W	
R99			RK73GB1J101J	CHIP R 100 J 1/16W	
R100			RK73GB1J680J	CHIP R 68 J 1/16W	
R101			RK73GB1J470J	CHIP R 47 J 1/16W	
R102			RK73GB1J332J	CHIP R 3.3K J 1/16W	
R103			RK73GB1J102J	CHIP R 1.0K J 1/16W	
R105			RK73GB1J270J	CHIP R 27 J 1/16W	
R106			R92-1252-05	CHIP R 0 OHM	
R107			RK73GB1J470J	CHIP R 47 J 1/16W	
R109			RK73GB1J101J	CHIP R 100 J 1/16W	
R113			RK73GB1J471J	CHIP R 470 J 1/16W	
R114			R92-1252-05	CHIP R 0 OHM	
R120,121			RK73GB1J152J	CHIP R 1.5K J 1/16W	
R122,123			RK73GB1J100J	CHIP R 10 J 1/16W	
R124,125			RK73GB1J152J	CHIP R 1.5K J 1/16W	
R126,127			RK73GB1J100J	CHIP R 10 J 1/16W	
R128			RK73GB1J472J	CHIP R 4.7K J 1/16W	
R129,130			RK73GB1J473J	CHIP R 47K J 1/16W	
R131			RK73GB1J102J	CHIP R 1.0K J 1/16W	
R133			RK73GB1J103J	CHIP R 10K J 1/16W	
R134			RK73GB1J821J	CHIP R 820 J 1/16W	
R135			RK73GB1J5R6J	CHIP R 5.6 J 1/16W	
R136			RK73GB1J821J	CHIP R 820 J 1/16W	
R137,138			RK73GB1J102J	CHIP R 1.0K J 1/16W	
R139-142			R92-1252-05	CHIP R 0 OHM	
R143			RK73GB1J102J	CHIP R 1.0K J 1/16W	
R144			RK73GB1J472J	CHIP R 4.7K J 1/16W	
R145			RK73FB2A470J	CHIP R 47 J 1/10W	
R148			RK73GB1J472J	CHIP R 4.7K J 1/16W	
R150			RK73GB1J180J	CHIP R 18 J 1/16W	
R151-158			RK73GB1J102J	CHIP R 1.0K J 1/16W	
R160,161			RK73GB1J471J	CHIP R 470 J 1/16W	
R162-164			RK73GB1J271J	CHIP R 270 J 1/16W	
R165			RK73GB1J471J	CHIP R 470 J 1/16W	
R166			RK73GB1J223J	CHIP R 22K J 1/16W	
R168			RK73GB1J271J	CHIP R 270 J 1/16W	K3
R168			R92-1252-05	CHIP R 0 OHM	K,K2,E
R169			RK73GB1J392J	CHIP R 3.9K J 1/16W	K3
R170			R92-1252-05	CHIP R 0 OHM	K,K2,E
R171-174			R92-1252-05	CHIP R 0 OHM	K3
R174,175			R92-1252-05	CHIP R 0 OHM	K,K2,E
R175			RK73GB1J391J	CHIP R 390 J 1/16W	K3
R176			RK73GB1J473J	CHIP R 47K J 1/16W	K3
R177-179			R92-1252-05	CHIP R 0 OHM	K,K2,E
R178			R92-1252-05	CHIP R 0 OHM	K3
R600			RK73GB1J473J	CHIP R 47K J 1/16W	

PARTS LIST

TX-RX UNIT (X57-6270-XX)

Ref. No.	Address	New parts	Parts No.	Description	Desti-nation
R601			R92-0670-05	CHIP R 0 OHM	
R602			RK73GB1J472J	CHIP R 4.7K J 1/16W	
R603			RK73GB1J102J	CHIP R 1.0K J 1/16W	
R604			RK73GB1J333J	CHIP R 33K J 1/16W	
R605			RK73GB1J104J	CHIP R 100K J 1/16W	
R606			RK73GB1J473J	CHIP R 47K J 1/16W	
R607-613			R92-1252-05	CHIP R 0 OHM	
R614			RK73GB1J473J	CHIP R 47K J 1/16W	
R615			R92-1252-05	CHIP R 0 OHM	
R616			RK73GB1J473J	CHIP R 47K J 1/16W	
R618			R92-1252-05	CHIP R 0 OHM	
R619			RK73GB1J473J	CHIP R 47K J 1/16W	
R620-622			RK73GB1J102J	CHIP R 1.0K J 1/16W	
R623,624			R92-1252-05	CHIP R 0 OHM	
R625-628			RK73GB1J102J	CHIP R 1.0K J 1/16W	
R629			R92-1252-05	CHIP R 0 OHM	
R630,631			RK73GB1J473J	CHIP R 47K J 1/16W	
R633,634			RK73GB1J473J	CHIP R 47K J 1/16W	
R635,636			RK73GB1J102J	CHIP R 1.0K J 1/16W	
R637			R92-1252-05	CHIP R 0 OHM	
R638			RK73GB1J102J	CHIP R 1.0K J 1/16W	
R639			R92-1252-05	CHIP R 0 OHM	
R640			RK73GB1J102J	CHIP R 1.0K J 1/16W	
R641			R92-1252-05	CHIP R 0 OHM	
R642			RK73GB1J102J	CHIP R 1.0K J 1/16W	
R643			RK73GB1J473J	CHIP R 47K J 1/16W	
R644			RK73GB1J102J	CHIP R 1.0K J 1/16W	
R645,646			RK73GB1J473J	CHIP R 47K J 1/16W	
R647-652			RK73GB1J102J	CHIP R 1.0K J 1/16W	
R653,654			R92-0670-05	CHIP R 0 OHM	
R655			RK73GB1J473J	CHIP R 47K J 1/16W	
R656			RK73GB1J102J	CHIP R 1.0K J 1/16W	
R657-661			RK73GB1J473J	CHIP R 47K J 1/16W	
R662			RK73GB1J102J	CHIP R 1.0K J 1/16W	
R663-667			RK73GB1J473J	CHIP R 47K J 1/16W	
R668			RK73GB1J183J	CHIP R 18K J 1/16W	
R669-671			RK73GB1J223J	CHIP R 22K J 1/16W	
R672-674			RK73GB1J104J	CHIP R 100K J 1/16W	
R675			RK73GB1J333J	CHIP R 33K J 1/16W	
R676			RK73GB1J823J	CHIP R 82K J 1/16W	
R678			RK73GB1J104J	CHIP R 100K J 1/16W	
R679,680			RK73GB1J223J	CHIP R 22K J 1/16W	
R681			RK73GB1J183J	CHIP R 18K J 1/16W	
R682			RK73GB1J153J	CHIP R 15K J 1/16W	
R683			RK73GB1J124J	CHIP R 120K J 1/16W	
R684			RK73GB1J473J	CHIP R 47K J 1/16W	
R685,686			RK73GB1J104J	CHIP R 100K J 1/16W	
R687			RK73GB1J223J	CHIP R 22K J 1/16W	
R688-690			RK73GB1J473J	CHIP R 47K J 1/16W	
R691-693			R92-1252-05	CHIP R 0 OHM	
R694,695			RK73GB1J101J	CHIP R 100 J 1/16W	
R696			RK73GB1J103J	CHIP R 10K J 1/16W	
R697			RK73GB1J101J	CHIP R 100 J 1/16W	
R698			RK73GB1J103J	CHIP R 10K J 1/16W	
R699			R92-1252-05	CHIP R 0 OHM	
R700			RK73GB1J101J	CHIP R 100 J 1/16W	
R701			R92-1252-05	CHIP R 0 OHM	
R702			RK73GB1J473J	CHIP R 47K J 1/16W	
R703			R92-1252-05	CHIP R 0 OHM	
R704-706			RK73GB1J473J	CHIP R 47K J 1/16W	
R707-709			RK73GB1J223J	CHIP R 22K J 1/16W	
R710			RK73GB1J473J	CHIP R 47K J 1/16W	
R712			RK73GB1J473J	CHIP R 47K J 1/16W	
R713			RK73GB1J273J	CHIP R 27K J 1/16W	
R714			RK73GB1J223J	CHIP R 22K J 1/16W	
R715			RK73GB1J103J	CHIP R 10K J 1/16W	
R717,718			RK73GB1J473J	CHIP R 47K J 1/16W	
R719			RK73GB1J104J	CHIP R 100K J 1/16W	
R720			RK73GB1J473J	CHIP R 47K J 1/16W	
R721			RK73GB1J223J	CHIP R 22K J 1/16W	
R722			RK73GB1J334J	CHIP R 330K J 1/16W	
R723,724			R92-1252-05	CHIP R 0 OHM	
R726			RK73GB1J473J	CHIP R 47K J 1/16W	
R727			R92-1252-05	CHIP R 0 OHM	
R728,729			RK73GB1J223J	CHIP R 22K J 1/16W	
R730			RK73GB1J101J	CHIP R 100 J 1/16W	
R731			RK73GB1J472J	CHIP R 4.7K J 1/16W	
R732			RK73GB1J473J	CHIP R 47K J 1/16W	
R733			R92-1252-05	CHIP R 0 OHM	
R734			RK73GB1J473J	CHIP R 47K J 1/16W	
R735			RK73GB1J333J	CHIP R 33K J 1/16W	
R736,737			RK73GB1J473J	CHIP R 47K J 1/16W	
R738			RK73GB1J274J	CHIP R 270K J 1/16W	
R739			RK73GB1J103J	CHIP R 10K J 1/16W	
R740			RK73GB1J104J	CHIP R 100K J 1/16W	
R741			RK73GB1J154J	CHIP R 150K J 1/16W	
R742			R92-0670-05	CHIP R 0 OHM	
R743			RK73GB1J473J	CHIP R 47K J 1/16W	
R744			RK73GB1J393J	CHIP R 39K J 1/16W	
R745			RK73GB1J473J	CHIP R 47K J 1/16W	
R747			RK73GB1J103J	CHIP R 10K J 1/16W	
R749-752			R92-1252-05	CHIP R 0 OHM	
R753,754			RK73GB1J473J	CHIP R 47K J 1/16W	
R755,756			R92-0670-05	CHIP R 0 OHM	
R758			RK73GB1J103J	CHIP R 10K J 1/16W	
R760			RK73GB1J122J	CHIP R 1.2K J 1/16W	
R762			RK73GB1J472J	CHIP R 4.7K J 1/16W	
R763			RK73GB1J103J	CHIP R 10K J 1/16W	
R764,765			RK73GB1J102J	CHIP R 1.0K J 1/16W	
R766			RK73GB1J122J	CHIP R 1.2K J 1/16W	
R767			RK73GB1J473J	CHIP R 47K J 1/16W	
R768			RK73GB1J122J	CHIP R 1.2K J 1/16W	
R769,770			R92-0670-05	CHIP R 0 OHM	
R771			RK73GB1J122J	CHIP R 1.2K J 1/16W	
R772			RK73GB1J473J	CHIP R 47K J 1/16W	
R773			RK73GB1J102J	CHIP R 1.0K J 1/16W	
R774			RK73GB1J105J	CHIP R 1.0M J 1/16W	
R775			RK73GB1J473J	CHIP R 47K J 1/16W	
R776			RK73GB1J102J	CHIP R 1.0K J 1/16W	
R777			RK73GB1J473J	CHIP R 47K J 1/16W	
R778			RK73GB1J102J	CHIP R 1.0K J 1/16W	
R779			RK73GB1J473J	CHIP R 47K J 1/16W	
R780			RK73GB1J102J	CHIP R 1.0K J 1/16W	
R781			RK73GB1J471J	CHIP R 470 J 1/16W	
R782			RK73GB1J473J	CHIP R 47K J 1/16W	
R783			RK73GB1J102J	CHIP R 1.0K J 1/16W	
R784			RK73GB1J473J	CHIP R 47K J 1/16W	
R785			RK73GB1J102J	CHIP R 1.0K J 1/16W	
R786			RK73GB1J473J	CHIP R 47K J 1/16W	
R787			RK73GB1J102J	CHIP R 1.0K J 1/16W	

PARTS LIST

TX-RX UNIT (X57-6270-XX)
RX PLL/VCO (X58-4800-XX)

Ref. No.	Address	New parts	Parts No.	Description	Desti- nation
R788			RK73GB1J473J	CHIP R 47K J 1/16W	
R789			RK73GB1J102J	CHIP R 1.0K J 1/16W	
R790			RK73GB1J473J	CHIP R 47K J 1/16W	
R791			RK73GB1J102J	CHIP R 1.0K J 1/16W	
R792			RK73GB1J473J	CHIP R 47K J 1/16W	
R793			RK73GB1J102J	CHIP R 1.0K J 1/16W	
R794			RK73GB1J473J	CHIP R 47K J 1/16W	
R795			RK73GB1J102J	CHIP R 1.0K J 1/16W	
R796			RK73GB1J473J	CHIP R 47K J 1/16W	
R797			RK73GB1J102J	CHIP R 1.0K J 1/16W	
R798			RK73GB1J473J	CHIP R 47K J 1/16W	
R799			RK73GB1J102J	CHIP R 1.0K J 1/16W	
R800			RK73GB1J473J	CHIP R 47K J 1/16W	
R801			RK73GB1J102J	CHIP R 1.0K J 1/16W	
R802			RK73FB2A2R2J	CHIP R 2.2 J 1/10W	
R803			RK73GB1J473J	CHIP R 47K J 1/16W	
R804			RK73GB1J102J	CHIP R 1.0K J 1/16W	
R805			RK73GB1J473J	CHIP R 47K J 1/16W	
R806			RK73GB1J102J	CHIP R 1.0K J 1/16W	
R807			RK73GB1J473J	CHIP R 47K J 1/16W	
R808			RK73GB1J102J	CHIP R 1.0K J 1/16W	
R809			RK73GB1J473J	CHIP R 47K J 1/16W	
R810			RK73GB1J102J	CHIP R 1.0K J 1/16W	
R811			RK73GB1J473J	CHIP R 47K J 1/16W	
R812			RK73GB1J223J	CHIP R 22K J 1/16W	
R813,814			RK73GB1J473J	CHIP R 47K J 1/16W	
R815			RK73GB1J104J	CHIP R 100K J 1/16W	
K1			S76-0401-05	RELAY	
D1-4			DAN235K	DIODE	
D5			MA742	DIODE	
D7			1SS355	DIODE	
D8			DAN235K	DIODE	
D9			HSM88AS	DIODE	
D11			02DZ5.1(Y)	ZENER DIODE	
D12			02DZ18(X,Y)	ZENER DIODE	
D13			MA742	DIODE	K3
D600			DA204U	DIODE	
D601			MA2S111	DIODE	
D606-625			DA204U	DIODE	
D626			MINISMDE190	VARISTOR	
D627,628			1SS355	DIODE	
D629			DA204U	DIODE	
IC1,2			NJM4558E	MOS IC	
IC3			NJM78L05UA	BI-POLAR IC	
IC4			NJM7808FA	BI-POLAR IC	
IC5			AN8009M	MOS IC	
IC6			M62354GP	MOS IC	
IC7			BU4094BCF	MOS IC	
IC9		*	TK14489V	BI-POLAR IC	
IC10			TA7808F	ANALOG IC	
IC11			NJM78L05UA	BI-POLAR IC	
IC600			AT2408N10SI2.5	ROM IC	
IC601			RH5VL42C	MOS IC	
IC602			BU4094BCFV	MOS IC	
IC603			TC74LVX4245FS	MOS IC	
IC604		*	30622M4-113GP	MPU	
IC605			BU4053BCF	MOS IC	
IC606			TC74LVX4245FS	MOS IC	

Ref. No.	Address	New parts	Parts No.	Description	Desti- nation
IC607			NJM4558E	MOS IC	
IC608			TA75S01F	MOS IC	
IC609			AT29C020-90TI	ROM IC	
IC610			TA75S01F	MOS IC	
IC611			NJM4558E	MOS IC	
IC612			TC7S04FU	MOS IC	
IC613			TC74VHC4040FT	MOS IC	
IC614			AK4550VT	MOS IC	
IC615			M62364FP	MOS IC	
IC616,617			NJM4558E	MOS IC	
IC618			320VC5402PGE	MPU	
IC619			TC75W51FU	MOS IC	
IC620		*	ADM202EARN	MOS IC	
IC621			TC7S00FU	MOS IC	
IC622			TC7S66FU	MOS IC	
IC623			BU4094BCFV	MOS IC	
IC624			XC62FP1802P	MOS IC	
IC625,626			XC62FP3302P	MOS IC	
IC627,628			TA78L05F	MOS IC	
IC629	3B		LA4422	BI-POLAR IC	
IC630			TA78L05F	MOS IC	
Q1,2			2SC3357	TRANSISTOR	
Q3			2SC3356(R24)	TRANSISTOR	
Q4			DTC144EUA	DIGITAL TRANSISTOR	
Q5			DTA144EUA	DIGITAL TRANSISTOR	
Q6			DTC144EUA	DIGITAL TRANSISTOR	
Q7			2SC4617(S)	TRANSISTOR	
Q8,9			2SC3356	TRANSISTOR	
Q10			2SC3357	TRANSISTOR	
Q11			2SC3356(R24)	TRANSISTOR	
Q12-15			2SC4116(GR)	TRANSISTOR	
Q16			2SB1132(Q,R)	TRANSISTOR	
Q17			DTC114EUA	DIGITAL TRANSISTOR	
Q18			2SB1386(R)	TRANSISTOR	
Q19,20			DTC114EUA	DIGITAL TRANSISTOR	
Q23			DTC114EUA	DIGITAL TRANSISTOR	
Q24			DTD114EK	DIGITAL TRANSISTOR	
Q25			DTC114EUA	DIGITAL TRANSISTOR	K,K2,E
Q25,26			DTC114EUA	DIGITAL TRANSISTOR	K3
Q600			2SK1824	FET	
Q601			DTC114EUA	DIGITAL TRANSISTOR	
Q602			2SK1824	FET	
Q603			DTC114EUA	DIGITAL TRANSISTOR	
Q604			2SK1824	FET	
Q605			DTC114EUA	DIGITAL TRANSISTOR	
Q606			DTC363EK	DIGITAL TRANSISTOR	
Q609			DTC114EUA	DIGITAL TRANSISTOR	
Q610			2SJ506(S)	FET	
Q611			DTC114EUA	DIGITAL TRANSISTOR	
TH1			157-503-53006	THERMISTOR	
A1			W02-1939-05	DBM	

RX PLL/VCO (X58-4800-XX) -10 : K,E -11 : K2 -12 : K3

Ref. No.	Address	New parts	Parts No.	Description	Desti- nation
C304,305			CK73GB1H102K	CHIP C 1000PF K	
C306			CK73GB1H103K	CHIP C 0.010UF K	
C307			CK73GB1H471K	CHIP C 470PF K	
C308-310			CK73FB1E104K	CHIP C 0.10UF K	
C311			C92-0001-05	CHIP C 0.1UF 35WV	

PARTS LIST

RX PLL/VCO (X58-4800-XX)
TX PLL/VCO (X58-4810-XX)

Ref. No.	Address	New parts	Parts No.	Description	Desti- nation
C312			CC73GCH1H060D	CHIP C 6.0PF D	K2
C312			CC73GCH1H070D	CHIP C 7.0PF D	K,E
C312			CC73GCH1H080D	CHIP C 8.0PF D	K3
C314			CC73GCH1H120J	CHIP C 12PF J	K,E
C314			CC73GCH1H150J	CHIP C 15PF J	K2
C314			CC73GCH1H180J	CHIP C 18PF J	K3
C315			CK73FB1H473K	CHIP C 0.047UF K	
C317			CC73GCH1H060D	CHIP C 6.0PF D	K2
C317			CC73GCH1H070D	CHIP C 7.0PF D	K,E
C317			CC73GCH1H080D	CHIP C 8.0PF D	K3
C318			C92-0514-05	CHIP-TAN 2.2UF 10WV	
C319			CK73GB1H471K	CHIP C 470PF K	
C320			C92-0514-05	CHIP-TAN 2.2UF 10WV	
C321			CC73GCH1H040C	CHIP C 4.0PF C	
C322			CK73GB1H471K	CHIP C 470PF K	
C323			CK73FB1E224K	CHIP C 0.22UF K	
C324			C92-0002-05	CHIP-TAN 0.22UF 35WV	
C325			CC73GCH1H040C	CHIP C 4.0PF C	
C350,351			CK73GB1H471K	CHIP C 470PF K	
C354			CK73GB1H471K	CHIP C 470PF K	
C355			CC73GCH1H050B	CHIP C 5.0PF B	K,K2,E
C355			CC73GCH1H060B	CHIP C 6.0PF B	K3
C356			CC73GCH1H060B	CHIP C 6.0PF B	K,K2,E
C356			CC73GCH1H070B	CHIP C 7.0PF B	K3
C357			CK73GB1H471K	CHIP C 470PF K	
C358,359			CC73GCH1H1R5B	CHIP C 1.5PF B	
C360,361			CK73FB1E104K	CHIP C 0.10UF K	
C362			CC73GCH1H220G	CHIP C 22PF G	
C363			CC73GCH1H150G	CHIP C 15PF G	K,K3,E
C363			CC73GCH1H180G	CHIP C 18PF G	K2
C364,365			CK73GB1H471K	CHIP C 470PF K	
C366-369			CC73GCH1H070B	CHIP C 7.0PF B	
C370,371			CC73GCH1H100C	CHIP C 10PF C	
C372,373			CK73GB1H471K	CHIP C 470PF K	
C374,375			CC73GCH1H0R5B	CHIP C 0.5PF B	
C376-378			CK73GB1H471K	CHIP C 470PF K	
C379			CC73GCH1H040C	CHIP C 4.0PF C	
C383			CK73GB1H471K	CHIP C 470PF K	
C386			CC73GCH1H101J	CHIP C 100PF J	K,K3,E
C386			CC73GCH1H220J	CHIP C 22PF J	K2
TC350,351		*	C05-0396-05	CERAMIC TRIMMER CAP (8P)	
CN300			E40-5699-05	PIN ASSY	
CN350			E40-5755-05	PIN ASSY	
CN351		*	E40-6098-05	PIN ASSY	
-		*	F10-2377-04	SHIELDING CASE	
L300			L92-0148-05	FERRITE CHIP	
L301,302			L40-1575-34	SMALL FIXED INDUCTOR (15NH)	K2
L301,302			L40-1875-34	SMALL FIXED INDUCTOR (18NH)	K,K3,E
L303			L40-1875-34	SMALL FIXED INDUCTOR (18NH)	K2
L303			L40-2275-34	SMALL FIXED INDUCTOR (22NH)	K,E
L303			L40-2775-34	SMALL FIXED INDUCTOR (27NH)	K3
L350-355			L40-1095-34	SMALL FIXED INDUCTOR (1UH)	
L356,357		*	L34-4607-05	AIR-CORE COIL	K2
L356,357		*	L34-4608-05	AIR-CORE COIL	K,E
L356,357		*	L34-4609-05	AIR-CORE COIL	K3
L358-361			L40-1595-34	SMALL FIXED INDUCTOR (1.5UH)	
L362			L40-2775-34	SMALL FIXED INDUCTOR (27NH)	K2
L362			L40-3371-34	SMALL FIXED INDUCTOR (33NH)	K,K3,E

Ref. No.	Address	New parts	Parts No.	Description	Desti- nation
R300			RK73GB1J100J	CHIP R 10 J 1/16W	
R301-304			RK73GB1J101J	CHIP R 100 J 1/16W	
R305			R92-1252-05	CHIP R 0 OHM	
R306			RK73GB1J220J	CHIP R 22 J 1/16W	
R308			RK73GB1J560J	CHIP R 56 J 1/16W	
R309			RK73GB1J331J	CHIP R 330 J 1/16W	K,K3,E
R309			RK73GB1J391J	CHIP R 390 J 1/16W	K2
R310			RK73GB1J332J	CHIP R 3.3K J 1/16W	
R311			RK73GB1J103J	CHIP R 10K J 1/16W	
R312			RK73GB1J331J	CHIP R 330 J 1/16W	K,K3,E
R312			RK73GB1J391J	CHIP R 390 J 1/16W	K2
R313			RK73GB1J222J	CHIP R 2.2K J 1/16W	
R314			RK73GB1J474J	CHIP R 470K J 1/16W	
R315			RK73GB1J151J	CHIP R 150 J 1/16W	
R316			RK73FB2A152J	CHIP R 1.5K J 1/10W	
R317,318			R92-1252-05	CHIP R 0 OHM	
R319			RK73GB1J330J	CHIP R 33 J 1/16W	
R320			RK73GB1J222J	CHIP R 2.2K J 1/16W	
R321			RK73GB1J273J	CHIP R 27K J 1/16W	
R322			RK73GB1J103J	CHIP R 10K J 1/16W	
R350-353			R92-1252-05	CHIP R 0 OHM	
R354,355			RK73GB1J330J	CHIP R 33 J 1/16W	
R356			RK73GB1J181J	CHIP R 180 J 1/16W	K2
R356			RK73GB1J221J	CHIP R 220 J 1/16W	K,K3,E
R357			RK73GB1J151J	CHIP R 150 J 1/16W	K2
R357			RK73GB1J181J	CHIP R 180 J 1/16W	K,K3,E
R358,359			RK73GB1J470J	CHIP R 47 J 1/16W	
R360-363			RK73GB1J472J	CHIP R 4.7K J 1/16W	
R364			RK73GB1J103J	CHIP R 10K J 1/16W	
R365			RK73GB1J333J	CHIP R 33K J 1/16W	
R366			RK73GB1J103J	CHIP R 10K J 1/16W	
R367			RK73GB1J101J	CHIP R 100 J 1/16W	
R368			RK73GB1J330J	CHIP R 33 J 1/16W	
D350-353			1SV282	VARIABLE CAPACITANCE DIODE	
IC300			SA7025DK	MOS IC	
Q300,301			2SC4116(GR)	TRANSISTOR	
Q302			2SC4226(R24)	TRANSISTOR	
Q350,351			2SK508NV(K52)	FET	
Q352,353			2SC4116(Y)	TRANSISTOR	
Q354			DTC114EUA	DIGITAL TRANSISTOR	
Q355			2SC4226(R24)	TRANSISTOR	

TX PLL/VCO (X58-4810-XX) -10 : K,E -11 : K2 -12 : K3

Ref. No.	Address	New parts	Parts No.	Description	Desti- nation
C304,305			CK73GB1H102K	CHIP C 1000PF K	
C306			CK73GB1H103K	CHIP C 0.010UF K	
C307			CK73GB1H471K	CHIP C 470PF K	
C308-310			CK73FB1E104K	CHIP C 0.10UF K	
C311			C92-0001-05	CHIP C 0.1UF 35WV	
C312			CC73GCH1H050C	CHIP C 5.0PF C	K2
C312			CC73GCH1H060D	CHIP C 6.0PF D	K,E
C312			CC73GCH1H070D	CHIP C 7.0PF D	K3
C314			CC73GCH1H100D	CHIP C 10PF D	K2
C314			CC73GCH1H120J	CHIP C 12PF J	K,K3,E
C315			CK73FB1H473K	CHIP C 0.047UF K	
C317			CC73GCH1H050C	CHIP C 5.0PF C	K2
C317			CC73GCH1H060D	CHIP C 6.0PF D	K,E
C317			CC73GCH1H070D	CHIP C 7.0PF D	K3
C318			C92-0514-05	CHIP-TAN 2.2UF 10WV	

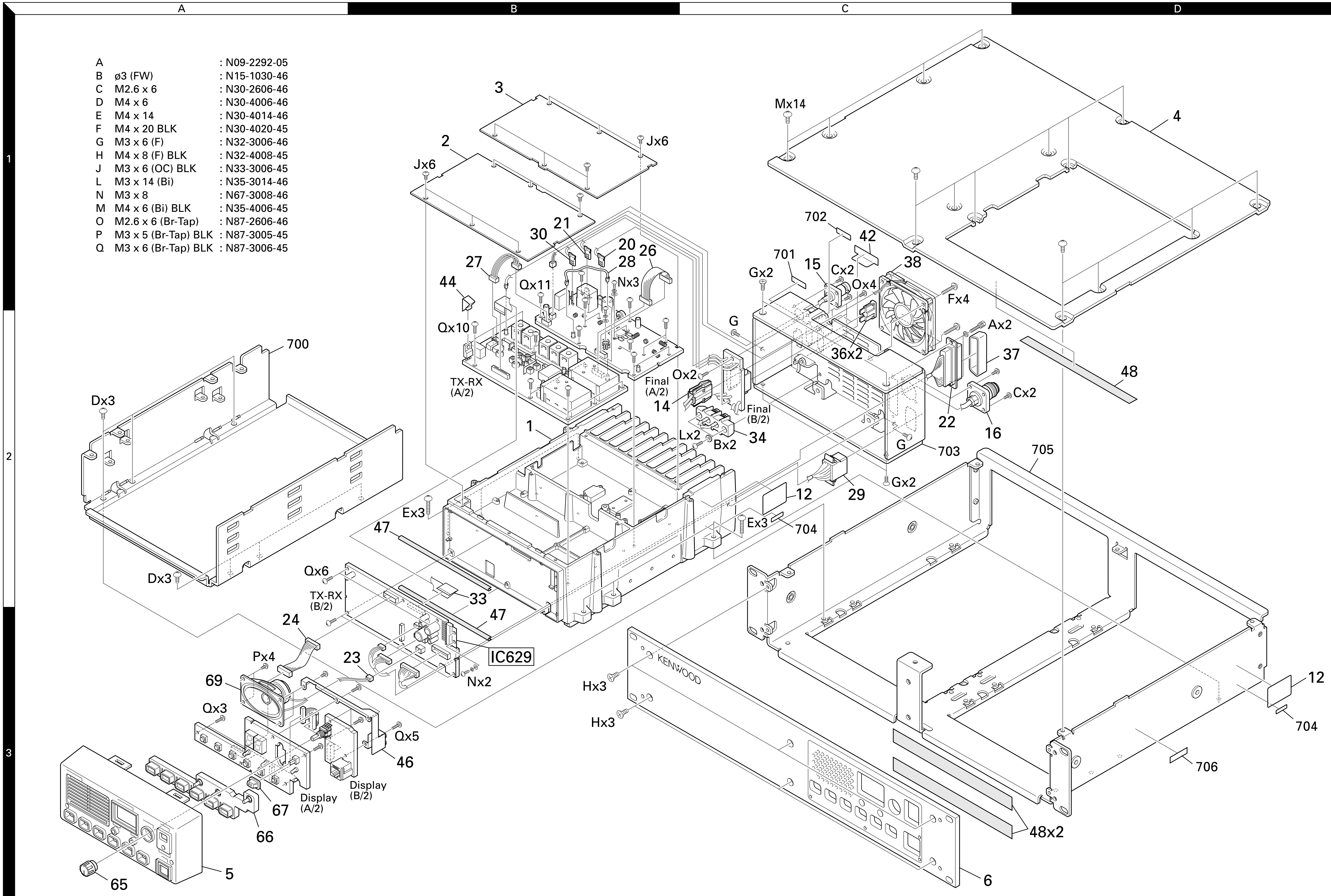
PARTS LIST

TX PLL/VCO (X58-4810-XX)

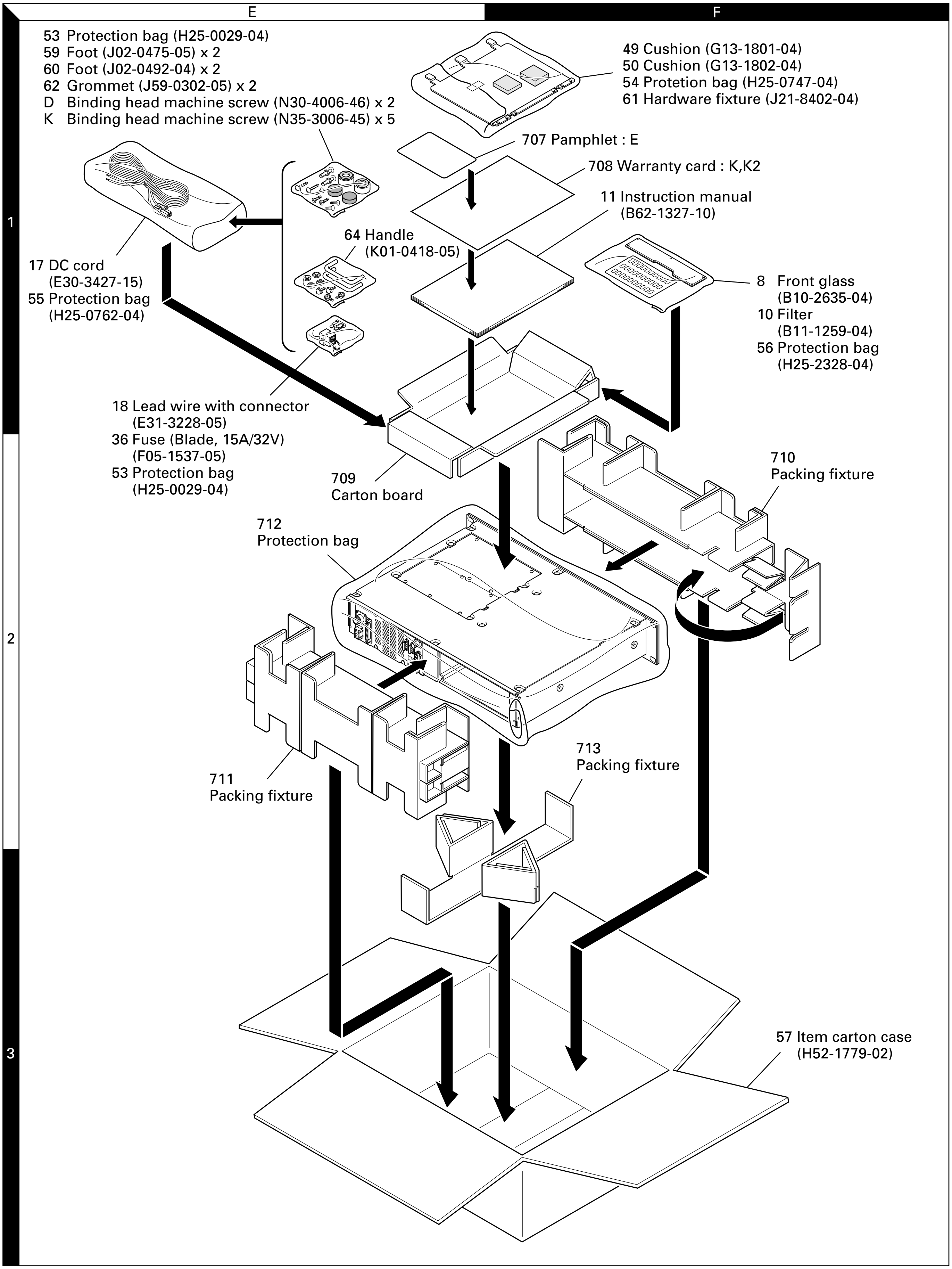
Ref. No.	Address	New parts	Parts No.	Description	Desti- nation
C319			CK73GB1H471K	CHIP C 470PF K	
C320			C92-0514-05	CHIP-TAN 2.2UF 10WV	
C321			CC73GCH1H040C	CHIP C 4.0PF C	
C322			CK73GB1H471K	CHIP C 470PF K	
C323			CK73FB1E224K	CHIP C 0.22UF K	
C324			C92-0002-05	CHIP-TAN 0.22UF 35WV	K,K2,E
C324			C92-0502-05	CHIP-TAN 0.33UF 35WV	K3
C325			CC73GCH1H040C	CHIP C 4.0PF C	
C350,351			CK73GB1H471K	CHIP C 470PF K	K,K2,E
C351			CK73GB1H471K	CHIP C 470PF K	K3
C352			CC73GCH1H101J	CHIP C 100PF J	K,K3,E
C353			CK73GB1H471K	CHIP C 470PF K	K3
C354			CK73GB1H471K	CHIP C 470PF K	K,K2,E
C355			CC73GCH1H100C	CHIP C 10PF C	K3
C356			CC73GCH1H070B	CHIP C 7.0PF B	K2
C356			CC73GCH1H080B	CHIP C 8.0PF B	K,E
C357			CK73GB1H471K	CHIP C 470PF K	K3
C358			CC73GCH1H030B	CHIP C 3.0PF B	K3
C359			CC73GCH1H1R5B	CHIP C 1.5PF B	K,K2,E
C360			CK73FB1E104K	CHIP C 0.10UF K	K,K2,E
C361			CK73FB1E104K	CHIP C 0.10UF K	K3
C362			CC73GCH1H120G	CHIP C 12PF G	K,K2,E
C363			CC73GCH1H180G	CHIP C 18PF G	K3
C364			CK73GB1H471K	CHIP C 470PF K	K,K2,E
C365			CK73GB1H471K	CHIP C 470PF K	K3
C366			CC73GCH1H070B	CHIP C 7.0PF B	K,K2,E
C367			CC73GCH1H070B	CHIP C 7.0PF B	K3
C368			CC73GCH1H070B	CHIP C 7.0PF B	K,K2,E
C369			CC73GCH1H080B	CHIP C 8.0PF B	K3
C370			CC73GCH1H070B	CHIP C 7.0PF B	K,K2,E
C371			CC73GCH1H080B	CHIP C 8.0PF B	K3
C374			CC73GCH1H0R5B	CHIP C 0.5PF B	K,K2,E
C375			CC73GCH1H0R5B	CHIP C 0.5PF B	K3
C377,378			CK73GB1H471K	CHIP C 470PF K	
C379			CC73GCH1H040C	CHIP C 4.0PF C	
C380			CC73GCH1H0R5B	CHIP C 0.5PF B	K,K2,E
C381			CC73GCH1H0R5B	CHIP C 0.5PF B	K3
C382,383			CC73GCH1H471J	CHIP C 470PF J	
TC350		✻	C05-0396-05	CERAMIC TRIMMER CAP (8P)	K,K2,E
TC351		✻	C05-0396-05	CERAMIC TRIMMER CAP (8P)	K3
CN300			E40-5699-05	PIN ASSY	
CN350			E40-5755-05	PIN ASSY	
CN351		✻	E40-6098-05	PIN ASSY	
-		✻	F10-2377-04	SHIELDING CASE	
L300			L92-0148-05	FERRITE CHIP	
L301,302			L40-1575-34	SMALL FIXED INDUCTOR (15NH)	K,K2,E
L301,302			L40-1875-34	SMALL FIXED INDUCTOR (18NH)	K3
L303			L40-1875-34	SMALL FIXED INDUCTOR (18NH)	K2
L303			L40-2275-34	SMALL FIXED INDUCTOR (22NH)	K,E
L303			L40-2775-34	SMALL FIXED INDUCTOR (27NH)	K3
L350,351			L40-1095-34	SMALL FIXED INDUCTOR (1UH)	K3
L352-354			L40-1095-34	SMALL FIXED INDUCTOR (1UH)	K,K2,E
L355			L40-1095-34	SMALL FIXED INDUCTOR (1UH)	K3
L356			L34-4605-05	AIR-CORE COIL	K2
L356		✻	L34-4645-05	AIR-CORE COIL	K,E
L357		✻	L34-4607-05	AIR-CORE COIL	K3
L358			L40-1095-34	SMALL FIXED INDUCTOR (1UH)	K,K2,E
L359			L40-1595-34	SMALL FIXED INDUCTOR (1.5UH)	K3
L360			L40-1095-34	SMALL FIXED INDUCTOR (1UH)	K,K2,E
L361			L40-1595-34	SMALL FIXED INDUCTOR (1.5UH)	K3
L362			L40-2275-34	SMALL FIXED INDUCTOR (22NH)	K2
L362			L40-3371-34	SMALL FIXED INDUCTOR (33NH)	K,K3,E
R300			RK73GB1J100J	CHIP R 10 J 1/16W	
R301-304			RK73GB1J101J	CHIP R 100 J 1/16W	
R305			R92-1252-05	CHIP R 0 OHM	
R306			RK73GB1J220J	CHIP R 22 J 1/16W	
R308			RK73GB1J560J	CHIP R 56 J 1/16W	
R309			RK73GB1J331J	CHIP R 330 J 1/16W	
R310			RK73GB1J332J	CHIP R 3.3K J 1/16W	
R311			RK73GB1J103J	CHIP R 10K J 1/16W	
R312			RK73GB1J331J	CHIP R 330 J 1/16W	
R313			RK73GB1J222J	CHIP R 2.2K J 1/16W	
R314			RK73GB1J474J	CHIP R 470K J 1/16W	
R315			RK73GB1J151J	CHIP R 150 J 1/16W	
R316			RK73FB2A152J	CHIP R 1.5K J 1/10W	
R317,318			R92-1252-05	CHIP R 0 OHM	
R319			RK73GB1J330J	CHIP R 33 J 1/16W	
R320			RK73GB1J222J	CHIP R 2.2K J 1/16W	
R321			RK73GB1J273J	CHIP R 27K J 1/16W	
R322			RK73GB1J103J	CHIP R 10K J 1/16W	
R350			R92-1252-05	CHIP R 0 OHM	K3
R351			R92-1252-05	CHIP R 0 OHM	K,K2,E
R352			R92-1252-05	CHIP R 0 OHM	K3
R353			R92-1252-05	CHIP R 0 OHM	K,K2,E
R354			RK73GB1J330J	CHIP R 33 J 1/16W	K,K2,E
R355			RK73GB1J330J	CHIP R 33 J 1/16W	K3
R358			RK73GB1J470J	CHIP R 47 J 1/16W	K3
R359			RK73GB1J470J	CHIP R 47 J 1/16W	K,K2,E
R365			RK73GB1J333J	CHIP R 33K J 1/16W	
R366			RK73GB1J103J	CHIP R 10K J 1/16W	
R367			RK73GB1J820J	CHIP R 82 J 1/16W	
R368			RK73GB1J330J	CHIP R 33 J 1/16W	
R372,373			RK73GB1J104J	CHIP R 100K J 1/16W	K,K2,E
R374,375			RK73GB1J104J	CHIP R 100K J 1/16W	K3
R376			RK73GB1J151J	CHIP R 150 J 1/16W	K,K2,E
R377			RK73GB1J181J	CHIP R 180 J 1/16W	K3
D350			1SV282	VARIABLE CAPACITANCE DIODE	K,K2,E
D351			1SV282	VARIABLE CAPACITANCE DIODE	K3
D352			1SV282	VARIABLE CAPACITANCE DIODE	K,K2,E
D353			1SV282	VARIABLE CAPACITANCE DIODE	K3
D354			1SV214	VARIABLE CAPACITANCE DIODE	K,K2,E
D355			1SV214	VARIABLE CAPACITANCE DIODE	K3
IC300			SA7025DK	MOS IC	
Q300,301			2SC4116(GR)	TRANSISTOR	
Q302			2SC4226(R24)	TRANSISTOR	
Q350			2SK508NV(K52)	FET	K,K2,E
Q351			2SK508NV(K52)	FET	K3
Q355			2SC4226(R24)	TRANSISTOR	

EXPLODED VIEW

A		: N09-2292-05
B	ø3 (FW)	: N15-1030-46
C	M2.6 x 6	: N30-2606-46
D	M4 x 6	: N30-4006-46
E	M4 x 14	: N30-4014-46
F	M4 x 20 BLK	: N30-4020-45
G	M3 x 6 (F)	: N32-3006-46
H	M4 x 8 (F) BLK	: N32-4008-45
J	M3 x 6 (OC) BLK	: N33-3006-45
L	M3 x 14 (Bi)	: N35-3014-46
N	M3 x 8	: N67-3008-46
M	M4 x 6 (Bi) BLK	: N35-4006-45
O	M2.6 x 6 (Br-Tap)	: N87-2606-46
P	M3 x 5 (Br-Tap) BLK	: N87-3005-45
Q	M3 x 6 (Br-Tap) BLK	: N87-3006-45



PACKING



Parts with the exploded numbers larger than 700 are not supplied.

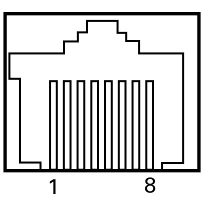
ADJUSTMENT

Test Equipment Required for Alignment

Test Equipment	Major Specifications	
1. Standard Signal Generator (SSG)	Frequency Range Modulation Output	400 to 512MHz Frequency modulation and external modulation 0.1µV to greater than 1mV
2. Power Meter	Input Impedance Operation Frequency Measurement Capability	50Ω 400 to 512MHz or more Vicinity of 50W
3. Deviation Meter	Frequency Range	400 to 512MHz
4. Digital Volt Meter (DVM)	Measuring Range Accuracy	1 to 20V DC High input impedance for minimum circuit loading
5. Oscilloscope		DC through 30MHz
6. High Sensitivity Frequency Counter	Frequency Range Frequency Stability	10Hz to 600MHz 0.2ppm or less
7. Ammeter		13A or more
8. AF Volt Meter (AF VTVM)	Frequency Range Voltage Range	50Hz to 10kHz 3mV to 3V
9. Audio Generator (AG)	Frequency Range Output	50Hz to 5kHz 0 to 1V
10. Distortion Meter	Capability Input Level	3% or less at 1kHz 50mV to 10Vrms
11. Voltmeter	Measuring Range Input Impedance	10 to 1.5V DC or less 50kΩ/V or greater
12. 4Ω Dummy Load		Approx. 4Ω, 5W

The following parts are required for adjustment

• Test cable for local microphone



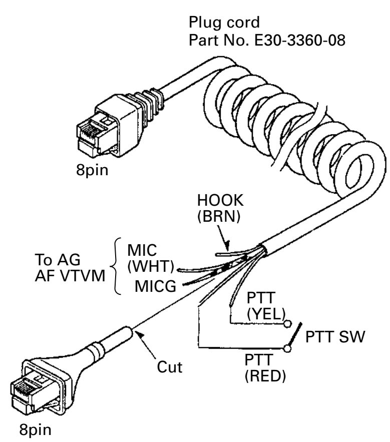
1 : NC
2 : +B
3 : GND
4 : PTT/TXD1 (PC serial data from radio)
5 : MIC GND
6 : MIC
7 : HOOK/RXD1 (PC serial data to radio)
8 : NC

MIC connector (Front panel view)

Test Channel (Default)

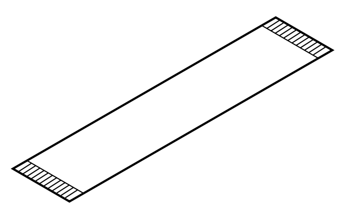
No.	K		E		K2		K3	
	RX	TX	RX	TX	RX	TX	RX	TX
1	450.10	450.00	440.10	440.00	480.10	480.00	400.10	400.00
2	465.10	465.00	455.10	455.00	496.10	496.00	415.10	415.00
3	479.90	480.00	469.90	470.00	511.90	512.00	429.90	430.00
4	455.10	455.00	445.10	445.00	485.10	485.00	405.10	405.00
5	460.10	460.00	450.10	450.00	490.10	490.00	410.10	410.00
6	470.10	470.00	460.10	460.00	500.10	500.00	420.10	420.00
7	475.10	475.00	465.10	465.00	505.10	505.00	425.10	425.00
8	462.60	462.50	452.60	452.50	493.60	493.50	412.60	412.50
9	467.60	467.50	457.60	457.50	498.60	498.50	417.60	417.50
10	440.10	440.00	459.90	460.00	499.90	500.00	419.90	420.00
11	459.90	460.00	479.90	480.00	519.90	520.00	439.90	440.00

• The following test cables are recommended.



Test cable for microphone input

To connect the TX-RX unit A/2 (CN14) to the TX-RX unit B/2 (CN602) while in servicing, you can use the 36-pin flat cable, E37-0979-05, which is available from the KENWOOD parts center.



Flat cable (36-pin) about 256mm

ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specifications/Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
1. Setting & Firmware writing	1) Connect the unit to a suitable DC power supply. 2) Turn the DC source switch on after connecting a PC and FPU cable to the radio. → "P.G." appears on LED display 3) Write the firmware to radio. After the end of firmware writing. → Red (TX) LED lights up							
2. Write test frequency	1) Connect the unit to a suitable DC power supply. 2) Turn the DC source switch on after connecting a PC and FPU cable to the radio. → "E1" appears on LED display 3) Write the test and shipping frequency to the radio. → Green (BUSY) LED lights up 4) End of test frequency writing.							
3. Setting	1) Connect the unit to a suitable DC power supply. 2) Turn the power switch on after connecting a PC and FPU cable to the radio. 3) Start up the program for the adjustment.							
4. RX PLL lock voltage	1) RX VCO A high CH : 11 **K** CH : 10 **K2,K3,E**	DVM	TX-RX (A/2)	RX-CV	RX VCO (A3)	TC350	1.50V	±0.1V
	2) RX VCO A low CH : 10 **K** CH : 1 **K2,K3,E**						Check	8V or less
	3) RX VCO B high CH : 3 **K,K2** CH : 11 **K3,E**				RX VCO (A3)	TC351	1.50V	±0.1V
	4) RX VCO B low CH : 5 **K** CH : 6 **K2,K3,E**						Check	8V or less
5. TX PLL lock voltage	1) TX VCO high CH : 3			TX-CV	TX VCO (A2)	TC350 **K,K2,E** TC351 **K3**	1.50V	±0.1V
	2) TX VCO low CH : 1						Check	8V or less
6. RX frequency	1) Connect the frequency counter to CN3, then measure the frequency CH : 2	f. counter		CN3			PC adj. Test CH–44.85MHz	50Hz or less
Note : RX frequency means the local frequency of the RX VCO. So its frequency is wanted frequency minus the IF frequency.								
7. Setting	1) Remove 8 pin cable and the coaxial cable from CN16, and CN19 on TX-RX side.							
8. TX frequency	1) Connect the frequency counter to CN19, then measure the frequency CH : 2	f. counter	TX-RX (A/2)	CN19			PC adj.	50Hz or less
9. Setting	1) Insert 8 pin cable and the coaxial cable to CN16, and CN19 on TX-RX side.							
10. Maximum power limitting	1) Measure the RF power at TX ANT. High CH	Power meter	Rear	TX ANT	Final	VR1	Adjust the RF power to 43W.	±1W
13. TX RF high power	1) Measure the RF power at TX ANT. Low CH 2) Center CH 3) High CH						PC adj. 40W (Shipping power)	±1W

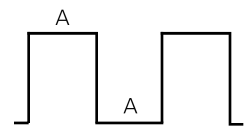
ADJUSTMENT

Item	Condition	Measurement: Test-equipment	Measurement: Unit	Measurement: Terminal	Adjustment: Unit	Adjustment: Parts	Adjustment: Method	Specifications/Remarks
12. TX RF low power	1) Measure the power level at TX ANT. Low CH 2) Center CH 3) High CH	Power meter	Rear	TX ANT			PC adj. 25W (Shipping power)	±1W
13. BPF	1) Connect the TG to RX ANT, then connect CN1 to the spectrum analyzer input. Spectrum analyzer setting Span : 50MHz Scale : 10dB to 5dB div Tracking generator setting Output : –30dBm	Tracking generator Spectrum analyzer	Rear TX-RX (A/2)	RX ANT CN1	TX-RX (A/2)	L2 L4 L5	Center the frequency you are using, then adjust it to look like the wave Fig. 1. (Page 48)	
14. MCF (Wide)	1) Connect the TG to CN2, then connect CN4 to the spectrum analyzer input. CH : 2 (Wide) Spectrum analyzer setting Span : 50kHz to 25kHz Scale : 10dB to 2dB div Center freq' : 44.850MHz Tracking generator setting Output : –30dBm			CN2 CN4		L14 L17 L18	Adjust it to look like the wave Fig. 2. (Page 48)	
(Narrow)	2) CH : 2 (Narrow)					L15 L16 L19	Adjust it to look like the wave Fig. 3. (Page 48)	
15. Discriminator	1) Connect the SSG to RX ANT. CH : 2 (Wide) SSG output : –53dBm/501µV SSG MOD : 1kHz SSG DEV : 3kHz AF : 2V/4Ω	SSG AF VM Distortion meter	Rear	RX ANT TEST/SPKR jack SPO (pin 12)		L24	Adjust the distortion to minimum.	
16. Threshold squelch (Wide)	1) Connect SSG to RX ANT. CH : 2 (Wide) SSG output : 3dB below to 12dB SINAD level SSG MOD : 1kHz SSG DEV : 3kHz AF : 2V/4Ω	SSG Audio analyzer VTVM Oscilloscope	Rear	RX ANT TEST/SPKR jack SPO (pin 12)			PC adj. Adjust to point of opening squelch	
	2) SSG : OFF						Check	Squelch must be closed.
(Narrow)	3) CH : 2 (Narrow) SSG output : 3dB below to 12dB SINAD level SSG MOD : 1kHz SSG DEV : 1.5kHz AF : 2V/4Ω						PC adj. Adjust to point of opening squelch	
	4) SSG : OFF						Check	Squelch must be closed.

ADJUSTMENT

Item	Condition	Measurement: Test-equipment	Measurement: Unit	Measurement: Terminal	Adjustment: Unit	Adjustment: Parts	Adjustment: Method	Specifications/Remarks
17. Tight squelch (Wide)	1) Connect SSG to RX ANT. CH : 2 (Wide) SSG output : 7dB over to 12dB SINAD level SSG MOD : 1kHz SSG DEV : 3kHz AF : 2V/4Ω	SSG Audio analyzer VTVM Oscilloscope	Rear	RX ANT TEST/SPKR jack SPO (pin 12)			PC adj. Adjust to point of opening squelch	
(Narrow)	2) CH : 2 (Narrow) SSG output : 7dB over to 12dB SINAD level SSG MOD : 1kHz SSG DEV : 1.5kHz AF : 2V/4Ω						PC adj. Adjust to point of opening squelch	
18. RD outut level (Wide)	1) Connect SSG to RX ANT. CH : 2 (Wide) SSG output : –53dBm/501µV SSG MOD : 1kHz SSG DEV : 1.5kHz	SSG DVM	Rear	RX ANT CONTROL I/O jack RD (pin 10) 4.7kΩ load			PC adj. 80mV	±5mV
(Narrow)	2) CH : 2 (Narrow) SSG output : –53dBm/501µV SSG MOD : 1kHz SSG DEV : 1.5kHz							
19. RA outut level (Wide)	1) Connect SSG to RX ANT. CH : 2 (Wide) SSG output : –53dBm/501µV SSG MOD : 1kHz SSG DEV : 1.5kHz	SSG DVM	Rear	RX ANT CONTROL I/O jack RA (pin 11) 4.7kΩ load			PC adj. 400mV	±20mV
(Narrow)	2) CH : 2 (Narrow) SSG output : –53dBm/501µV SSG MOD : 1kHz SSG DEV : 1.5kHz							
20. Maximum deviation (Wide)	1) Connect AG to the MIC terminal. Low CH (TX VCO low) Center CH (VCO center) High CH (TX VCO high) Deviation meter filter HPF : OFF LPF : 15kHz De-emphasis : OFF AG : 1kHz/50mV (Terminal load) Transmission	MOD ANA or Deviation meter Oscilloscope AG AF VTVM	Rear Front	TX OUT MIC			PC adj. 4.1kHz	±0.1kHz
(Narrow)	2) Low CH (TX VCO low) Center CH (VCO center) High CH (TX VCO high) Transmission						PC adj. 2.05kHz	±0.1kHz

ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specifications/Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
21. DQT balance (Wide)	1) CH : 2 Deviation meter filter HPF : OFF LPF : 3kHz De-emphasis : OFF Transmission	MOD ANA or Deviation meter Oscilloscope	Rear	TX OUT			PC adj. Make the de-modulated waves into square waves.	Oscilloscope DC range flat “A” part 
(Narrow)	2) CH : 2 Transmission							
22. QT deviation (Wide)	1) CH : 2 Deviation meter filter HPF : OFF LPF : 3kHz De-emphasis : OFF Detector : p-p/2 Transmission	MOD ANA or Deviation meter Oscilloscope	Rear	TX ANT			PC adj. 0.75kHz	±0.05kHz
(Narrow)	2) CH : 2 Transmission						PC adj. 0.35kHz	±0.05kHz
23. DQT deviation (Wide)	1) CH : 2 Deviation meter filter HPF : OFF LPF : 3kHz De-emphasis : OFF Detector : Peak hold Transmission						PC adj. 0.75kHz	±0.05kHz
(Narrow)	2) CH : 2 Transmission						PC adj. 0.35kHz	±0.05kHz
24. CW ID deviation (Wide)	1) CH2 Deviation meter filter HPF : OFF LPF : 15kHz De-emphasis : OFF Transmission						PC adj. 2kHz	±0.1kHz
(Narrow)	2) CH : 2 Transmission						PC adj. 1kHz	±0.05kHz
25. Test tone deviation (Wide)	1) CH : 2 Deviation meter filter HPF : OFF LPF : 15kHz De-emphasis : OFF Transmission						PC adj. 3kHz	±0.1kHz
(Narrow)	2) CH : 2 Transmission						PC adj. 1.5kHz	±0.05kHz

ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specifications/Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
26. TA (TX audio input) deviation (Wide)	1) Insert AG output into the control I/O TA terminal (pin 9). CH : 2 Deviation meter filter HPF : OFF LPF : 15kHz De-emphasis : OFF AG freq' : 1kHz (Sine wave) AG level : 280mV Transmission	MOD ANA or Deviation meter Oscilloscope AG AF VTVM	Rear	TX ANT CONTROL I/O jack TA (pin 9)			PC adj. 3.0kHz	±0.1kHz
(Narrow)	2) CH : 2 Transmission						PC adj. 1.5kHz	±0.05kHz
27. TD deviation (Wide)	1) Insert AG output into the control I/O TD terminal (pin 8). CH : 2 Deviation meter filter HPF : OFF LPF : 3kHz De-emphasis : OFF AG freq' : 100Hz (Sine wave) AG level : 0.5Vp-p (177mVrms) Transmission	MOD ANA or Deviation meter Oscilloscope AG AF VTVM	Rear	TX ANT CONTROL I/O jack TD (pin 8)			PC adj. 0.75kHz	±0.1kHz
(Narrow)	2) CH : 2 Transmission						PC adj. 0.35kHz	±0.05kHz
28. Repeat gain level (Wide)	1) CH : 2 SSG output : –53dBm SSG MOD : 1kHz SSG DEV : 1kHz Deviation meter filter HPF : OFF LPF : 15kHz De-emphasis : OFF Transmission	SSG MOD ANA or Deviation meter Oscilloscope	Rear	RX ANT TX ANT			PC adj. 1kHz	±0.1kHz
(Narrow)	1) CH : 2 Transmission							

ADJUSTMENT

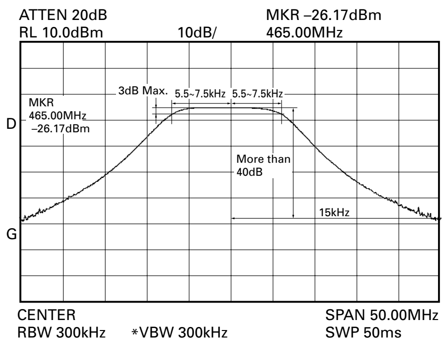


Fig. 1

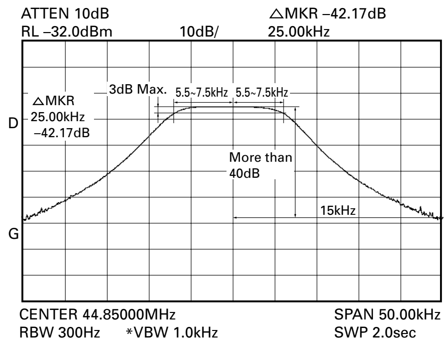


Fig. 2

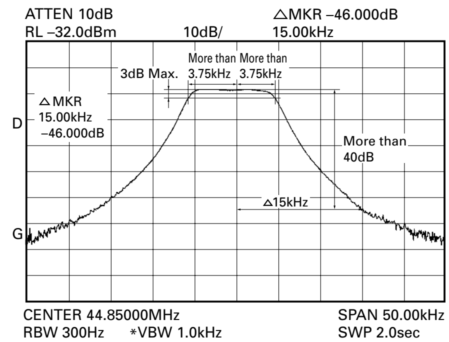
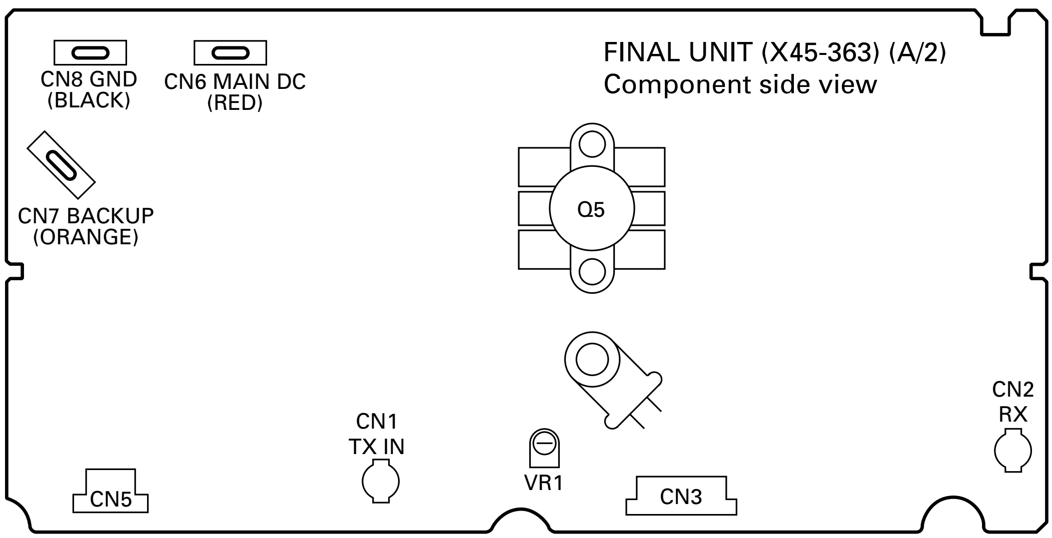
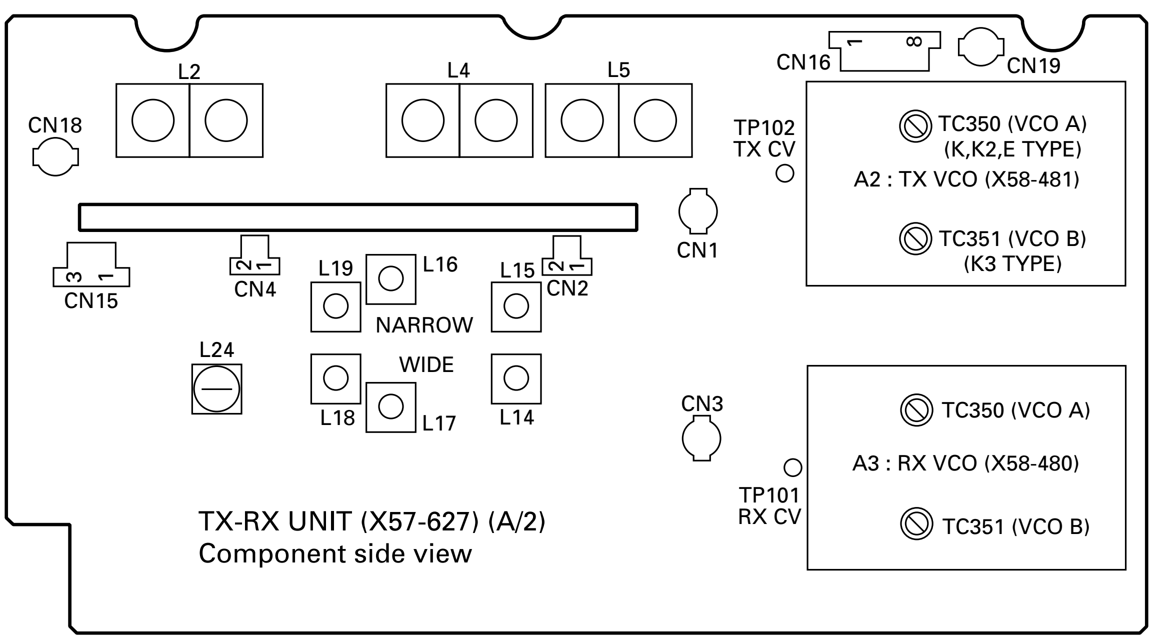


Fig. 3

Adjustment Points





TERMINAL FUNCTION

Final Unit (X45-3630-XX)

Connector No.	Terminal No.	Terminal Name	I/O	Terminal function
CN1		DRV	I	TX driver input signal (Coaxial)
CN2		–	–	Reserved
CN3	1	VTH	O	High temperature detector signal output
To X57	2	BAT	O	Main DC/BACKUP status output
(A/2)	3	PDT	O	RF power down signal output
TX-RX	4	FAS	I	Fan control signal input
unit	5	PC	I	TX power control signal input
	6	8T	I	8V input during transmission
	7	RSW	–	Reserved
	8	E	–	Ground
CN4		B	O	Power supply output for cooling fan
		FAG	O	Fan ground
CN5	1	E	–	Ground
	2	+B	O	Power supply output
	3	+B	O	Power supply output
CN6	1	Main DC	I	Power supply input (from Main DC terminal)
CN7	1	BACKUP	I	Power supply input (from BACKUP terminal)
CN8	1	GND	–	Ground

Display Unit (X54-3330-20) (A/2)

Connector No.	Terminal No.	Terminal Name	I/O	Terminal function
CN501	1	HOOK	I	Hook detection input/RXD input
	2	MIC	I	MIC signal input
To X54	3	MIG	–	MIC ground
(B/2)	4	PTT	I/O	PTT input/TXD output
display	5	GND	–	Ground
unit	6	NC	–	No connection
	7	SB	O	Power supply output after power switch
	8	NC	–	No connection
	9	GND	–	Ground
	10	5M	O	Common 5V output
	11	VLI	I	Volume control input for AF signal
CN502	1	MIG	–	MIC ground
	2	MIC	O	MIC signal output
To X57	3	VLI	O	Volume control output for AF signal
(B/2)	4	5C	I	Common 5V input
TX-RX	5	K4	I	KEY input 4
unit	6	K5	I	KEY input 5
control	7	K2	O	KEY output 2
section	8	K3	O	KEY output 3
	9	K1	O	KEY output 1
	10	HOOK/RXD	O	Hook detection output/RXD output
	11	SOE	I	Output enable for shift register
	12	PTT/TXD	I/O	PTT output/TXD input
	13	STB1	I	Strobe data for shift register
	14	CLK	I	Clock data input
	15	DAT	I	Serial data input
	16	PSW	O	Power switch output
	17	GND	–	Ground
	18	NC	–	No connection
	19	SB	I	Power supply input after power switch
	20	SB	I	Power supply input after power switch

Display Unit (X54-3330-20) (B/2)

Connector No.	Terminal No.	Terminal Name	I/O	Terminal function
CN601	1	VLI	O	Volume control output for AF signal
	2	5M	I	Common 5V input
To X54	3	GND	–	Ground
(A/2)	4	NC	–	No connection
display	5	SB	I	Power supply input after power switch
unit	6	NC	–	No connection
	7	GND	–	Ground
	8	PTT	I/O	PTT output/TXD input
	9	MIG	–	MIC ground
	10	MIC	O	MIC signal output
	11	HOOK	O	Hook detection output/RXD output
J601	1	NC	–	No connection
(Mic jack)	2	SB	O	Power supply output after power switch
	3	E	–	Ground
	4	PTT/TXD	I/O	PTT input/TXD output
	5	ME	–	MIC ground
	6	MIC	I	MIC signal input
	7	HOOK/RXD	I	Hook detection input/RXD input
	8	NC	–	No connection

TX-RX Unit (X57-6270-XX) (A/2) : TX-RX Section

Connector No.	Terminal No.	Terminal Name	I/O	Terminal function
CN1	–	–	O	Use for RX helical BPF tuning (Coaxial)
CN2	–	–	I	Use for RX MCF tuning
CN3	–	–	O	Use for RX frequency adjustment (Coaxial)
CN4	–	–	O	Use for RX MCF tuning
CN14	1	NC	–	No connection
	2	DET	O	Detection signal output
To X57	3	NC	–	No connection
(B/2)	4	GND	–	Ground
control	5	ASQ	O	Squelch signal output
section	6	RSSI	O	RSSI signal output
of TX-RX	7	NC	–	No connection
unit	8	DP	I	Data input for PLL
	9	CP	I	Clock input for PLL

TERMINAL FUNCTION

Connector No.	Terminal No.	Terminal Name	I/O	Terminal function
	10	EPR	I	Enable input for RX PLL
	11	EPT	I	Enable input for TX PLL
	12	LDR	O	Lock detector for RX PLL
	13	LDT	O	Lock detector for TX PLL
	14	DT	I	Data input
	15	CK	I	Clock input
	16	STB4	I	Strobe input for shift register
	17	FWD	O	RF power down signal output
	18	LD2	I	Latch data input for DA converter
	19	BUP	O	Backup signal output
	20	PSW	I	Power switch input
	21	TEMP	O	High temperature detector signal output
	22	SOE	I	Output enable for shift register
	23	GND	–	Ground
	24	MB	I	Modulation signal input for VCXO
	25	MO	I	Modulation signal input for VCO
	26	GND	–	Ground
	27	GND	–	Ground
	28	NC	–	No connection
	29	NC	–	No connection
	30	SB	O	Power supply output after power switch
	31	SB	O	Power supply output after power switch
	32	SB	O	Power supply output after power switch
	33	SB	O	Power supply output after power switch
	34	NC	–	No connection
	35	8C	O	Common 8V output
	36	8C	O	Common 8V output
CN15	1	E	–	Earth
	2	B	I	Power supply input
	3	B	I	Power supply input
CN16	1	E	–	Earth
	2	RSW	–	Reserved
To X45	3	8T	O	8V output during transmission
final	4	PC	O	TX power control signal output
unit	5	FAS	O	Fan control signal output
	6	PDT	I	RF power down signal input
	7	BAT	I	Main DC/BACKUP status input
	8	VTH	I	High temperature detector signal input
CN18	1	RX IN	I	Receive signal input (Coaxial)
CN19	1	DO	O	Transmission signal output (Coaxial)

TX-RX Unit (X57-6270-XX) (B/2) : Control Section

Connector No.	Terminal No.	Terminal Name	I/O	Terminal function
CN600	1	SB	O	Power supply output after power switch
To X54 (B/2)	2	SB	O	Power supply output after power switch
display	3	GND	–	Ground
unit	4	NC	–	No Connection
	5	DAT	O	Serial data output
	6	PSW	I	Power switch input
	7	STB1	O	Strobe data for shift register
	8	CLK	O	Clock data output
	9	SOE	O	Output enable for shift register
	10	TXD1	I/O	PTT input/TXD output
	11	K1	I	KEY input 1
	12	RXD1	I	Hook detection input/RXD input
	13	K2	I	KEY input 2
	14	K3	I	KEY input 3
	15	K4	O	KEY output 4
	16	K5	O	KEY output 5
	17	VLI	I	Volume control input for AF signal.
	18	5C	O	Common 5V output
	19	MIG	–	Mic ground
	20	MIC	I	MIC signal input
CN601	1	TXI	I	MIC signal input
	2	TXO	O	MIC signal output
To	3	RXI	I	RX audio signal input
optional	4	AC	O	Audio control signal output
board	5	BC1	O	Scramble code output.
	6	BC2	O	Scramble code output.
	7	BC3	O	Scramble code output.
	8	BC4	O	Scramble code output.
	9	PTI	I	PTT signal input
	10	CLRC	O	Clear code for scramble
	11	RXO	O	RX audio signal output
	12	PTO	O	PTT signal output
	13	5C	O	Common 5V output
	14	GND	–	Ground
CN602	1	8C	I	Common 8V input
	2	8C	I	Common 8V input
To X57	3	NC	–	No connection
(A/2)	4	SB	I	Power supply input after power switch
TX-RX	5	SB	I	Power supply input after power switch
unit	6	SB	I	Power supply input after power switch
	7	SB	I	Power supply input after power switch
	8	NC	–	No connection
	9	NC	–	No connection
	10	GND	–	Ground
	11	GND	–	Ground
	12	MO	O	Modulation signal output for VCO
	13	MB	O	Modulation signal output for VCXO

TERMINAL FUNCTION

Connector No.	Terminal No.	Terminal Name	I/O	Terminal function
	14	GND	–	Ground
	15	SOE	O	Output enable for shift register
	16	TEMP	I	High temperature detector signal input
	17	PSW	O	Power switch output
	18	BUP	I	Backup signal input
	19	LD2	O	Latch data output for DA converter
	20	FWD	I	RF power down signal input
	21	STB4	O	Strobe output for shift register
	22	CK	O	Clock output
	23	DT	O	Data output
	24	LDT	I	Lock detector for TX PLL
	25	LDR	I	Lock detector for RX PLL
	26	EPT	O	Enable output for TX PLL
	27	EPR	O	Enable output for RX PLL
	28	CP	O	Clock output for PLL
	29	DP	O	Data output for PLL
	30	NC	–	No connection
	31	RSSI	I	RSSI signal input
	32	ASQ	I	Squelch signal input
	33	GND	–	Ground
	34	NC	–	No connection
	35	DET	I	Detection signal input
	36	NC	–	No connection
CN603	1	SB	O	Power supply output after power switch
To ACC 15 pin	2	SB	O	Power supply output after power switch
connector	3	GND	–	Ground
	4	GND	–	Ground
CN604	1	AO5	O	Auxiliary output 5 (FPU selectable)
	2	AO4	O	Auxiliary output 4 (FPU selectable)
To ACC	3	AO3	O	Auxiliary output 3 (FPU selectable)
15 pin	4	SPO	O	External speaker output
connector	5	SPO	O	External speaker output
	6	AO2	O	Auxiliary output 2 (FPU selectable)
	7	AO1	O	Auxiliary output 1 (FPU selectable)
	8	SPI	I	Internal speaker input
	9	RSSI	O	RSSI signal output
	10	RD	O	RX data output
	11	SPG	–	External speaker ground
	12	SPG	–	External speaker ground
CN605	1	SP	O	Internal speaker AF output
	2	SPG	–	Internal speaker ground
CN606	1	NC	–	No connection
	2	NC	–	No connection
To ACC	3	SPM	I	Speaker mute signal input
25 pin	4	IO6	I/O	Programable I/O 6
D-sub	5	RXG	–	RX signal ground
connector	6	IO5	I/O	Programable I/O 5
	7	RA	O	RX audio output (voice)
	8	IO4	I/O	Programable I/O 4

Connector No.	Terminal No.	Terminal Name	I/O	Terminal function
	9	RD	O	RX data output (voice & data)
	10	IO3	I/O	Programable I/O 3
	11	TA	I	TX audio input (voice)
	12	IO2	I/O	Programable I/O 2
	13	TD	I	TX data input (data or signaling)
	14	IO1	I/O	Programable I/O 1
	15	DG	–	Control line ground
	16	TXG	–	TX signal ground
	17	AI3	I	Auxiliary input 3 (FPU selectable)
	18	NC	–	No connection
	19	AI2	I	Auxiliary input 2 (FPU selectable)
	20	SC	O	Squelch control output
	21	AI1	I	Auxiliary input 1 (FPU selectable)
	22	EPTT	I	External press-to-talk switch input
	23	TXD2	O	RS-232C output signal (for FPU)
	24	EMON	I	External monitor switch input
	25	RXD2	I	RS-232C input signal (for FPU)
	26	NC	–	No connection
	27	NC	–	No connection
	28	NC	–	No connection
	29	NC	–	No connection
	30	NC	–	No connection

VCO (RX) Unit (X58-4800-XX)

Connector No.	Terminal No.	Terminal Name	I/O	Terminal function
CN300	1	FIN	I	Prescaler RF signal input
	2	5C	I	Common 5V input
	3	LDR	O	Lock detector for RX PLL
	4	EPR	I	Enable input for RX PLL
	5	DP	I	Data input for PLL
	6	CP	I	Clock input for PLL
	7	REF	I	Reference frequency signal input
CN350	1	GND	–	Ground
	2	SRR	I	Switching signal input for RX VCO
	3	8CL	I	8V input through the ripple filter
	4	CV	I	RX PLL lock voltage
	5	9CL	I	9V input through the ripple filter
	6	NC	–	No connection
CN351	1	VO	O	RX VCO output
	2	GND	–	Ground

VCO (TX) Unit (X58-4810-XX)

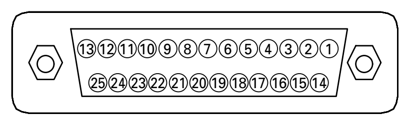
Connector No.	Terminal No.	Terminal Name	I/O	Terminal function
CN300	1	FIN	I	Prescaler RF signal input
	2	5C	I	Common 5V input
	3	LDT	O	Lock detector for TX PLL
	4	EPT	I	Enable input for TX PLL
	5	DP	I	Data input for PLL

TERMINAL FUNCTION

Connector No.	Terminal No.	Terminal Name	I/O	Terminal function
	6	CP	I	Clock input for PLL
	7	REF	I	Reference frequency signal input
CN350	1	GND	–	Ground
	2	STT	I	Switching signal input for TX VCO
	3	8CL	I	8V input through the ripple filter
	4	CV	I	RX PLL lock voltage
	5	9CL	I	9V input through the ripple filter
	6	MO	I	Modulation signal input
CN351	1	VO	O	TX VCO output
	2	GND	–	Ground

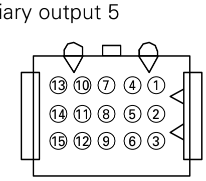
ACC 25 pin D-sub Connector

Connector No.	Terminal No.	Terminal Name	I/O	Terminal function
	1	NC	–	No connection
	2	RXD2	I	Serial data to radio
	3	TXD2	O	Serial data from radio
	4	AI1	I	Programmable function input 1
	5	AI2	I	Programmable function input 2
	6	AI3	I	Programmable function input 3
	7	DG	–	Control line ground
	8	TD	I	TX data input (data or signalling) Input impedance: 600Ω Coupling: AC coupling Deviation: 0.75kHz (wide)/ 0.35kHz (Narrow) (100Hz 0.5Vp-p input)
	9	TA	I	TX audio input (voice) Input impedance: 600Ω Coupling: AC coupling Frequency response: Pre-emphasis curve Deviation: 60% deviation (1kHz 280mVrms ±25mV input)
	10	RD	O	RX data output (voice & data) Output impedance: 1kΩ or less Coupling: AC coupling Non-squelched Frequency response: ±2.5dB at 10~3000Hz Output level: 70~90mVrms (standard modulation)
	11	RA	O	RX audio output (voice) Output impedance: 1kΩ or less Coupling: AC coupling Squelched Frequency response: De-emphasis curve Output level: 360~440mVrms (standard modulation)
	12	RXG	–	RX signal ground (for RA,RD ground only)
	13	SPM	I	Speaker mute signal input "L": Mute on
	14	NC	-	No connection
	15	EMON	I	External monitor switch input "L": Monitor on, "H": Monitor off
	16	EPTT	I	External press-to-talk switch input "L": PTT on, "H": PTT off
	17	SC	O	Squelch control output "L": Busy, "H": Not busy
	18	NC	-	No connection
	19	TXG	-	TX signal ground (for TA,TD ground only)
	20	AIO1	I/O	Programmable function input/output 1
	21	AIO2	I/O	Programmable function input/output 2
	22	AIO3	I/O	Programmable function input/output 3
	23	AIO4	I/O	Programmable function input/output 4
	24	AIO5	I/O	Programmable function input/output 5
	25	AIO6	I/O	Programmable function input/output 6

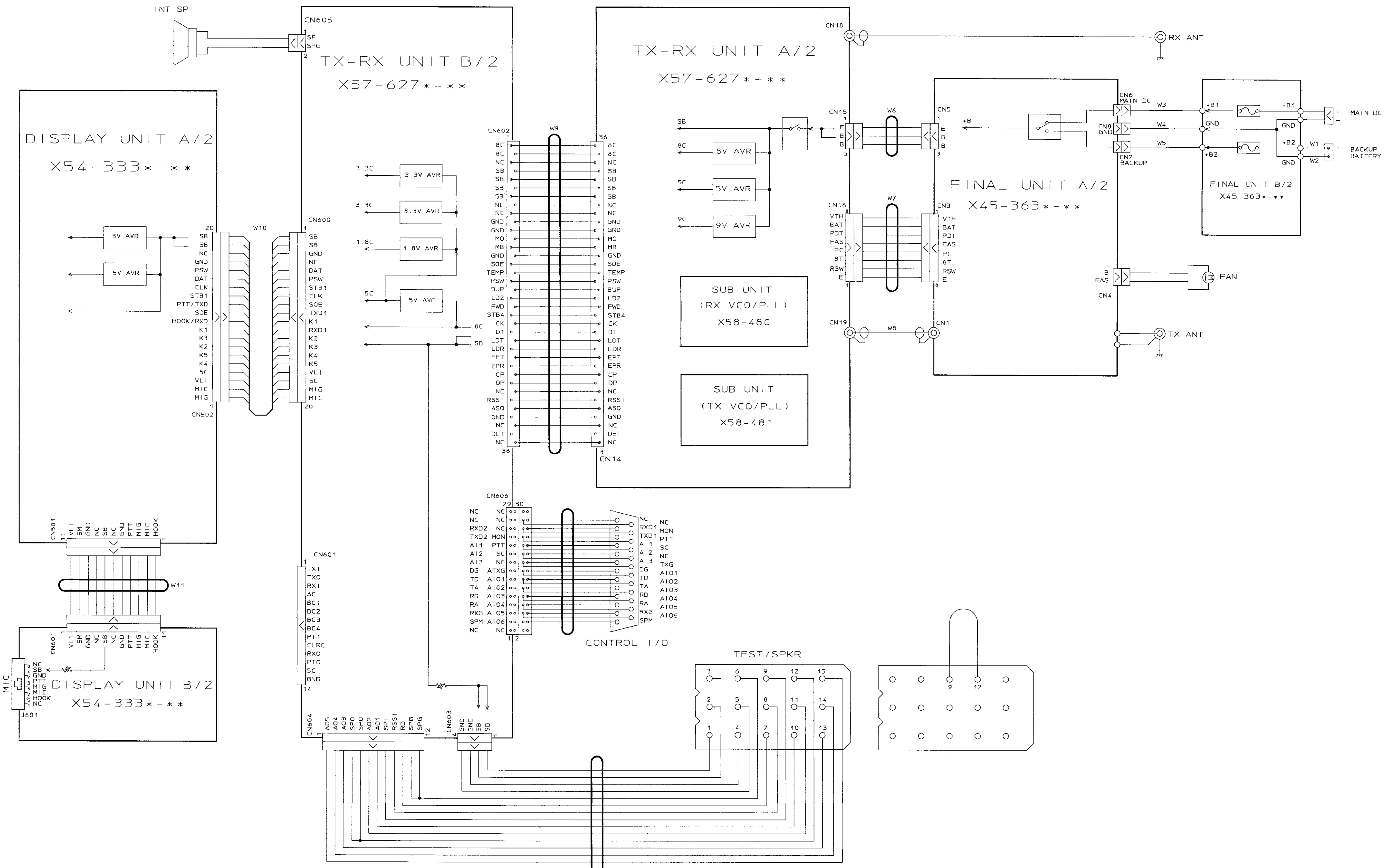


ACC 15 pin Connector

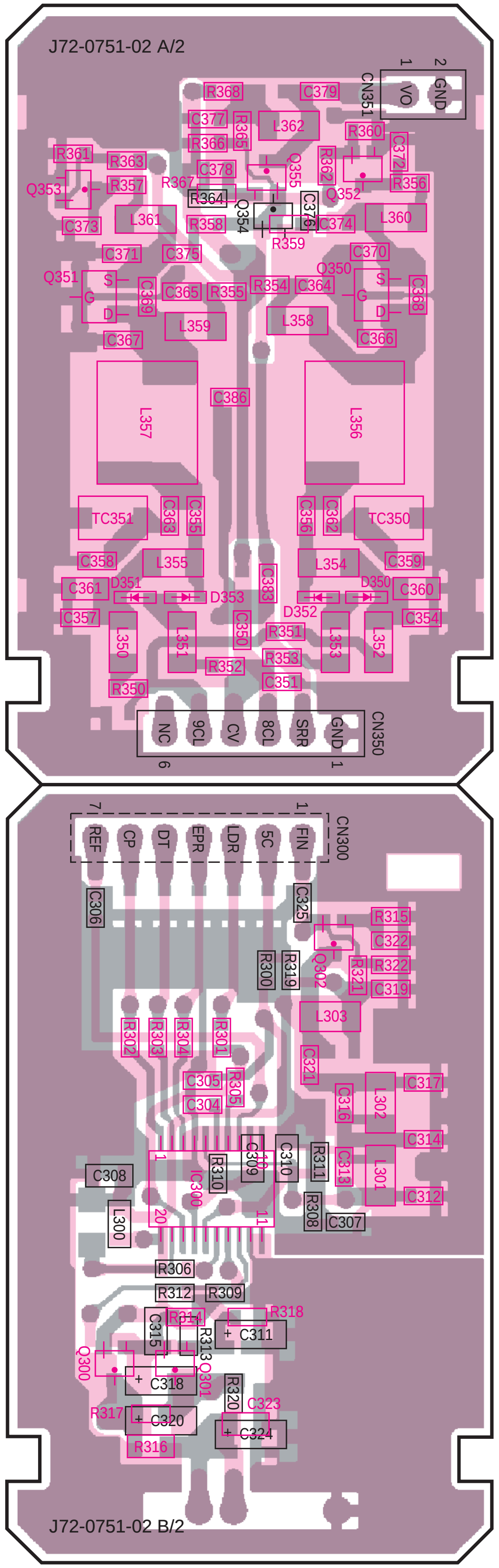
Connector No.	Terminal No.	Terminal Name	I/O	Terminal function
	1	SB	O	Power supply output after power switch; 1A maximum
	2	SB	O	Power supply output after power switch; 1A maximum
	3	NC	–	No connection
	4	GND	–	Ground
	5	GND	–	Ground
	6	SPG	–	Speaker ground
	7	RD	O	RX data output (Equal to D-sub connector terminal No. 10.)
	8	RSSI	O	RSSI output (Analog signal output)
	9	SPI	I	Internal speaker input
	10	AO1	O	Auxiliary output 1
	11	AO2	O	Auxiliary output 2
	12	SPO	O	External speaker output
	13	AO3	O	Auxiliary output 3
	14	AO4	O	Auxiliary output 4
	15	AO5	O	Auxiliary output 5



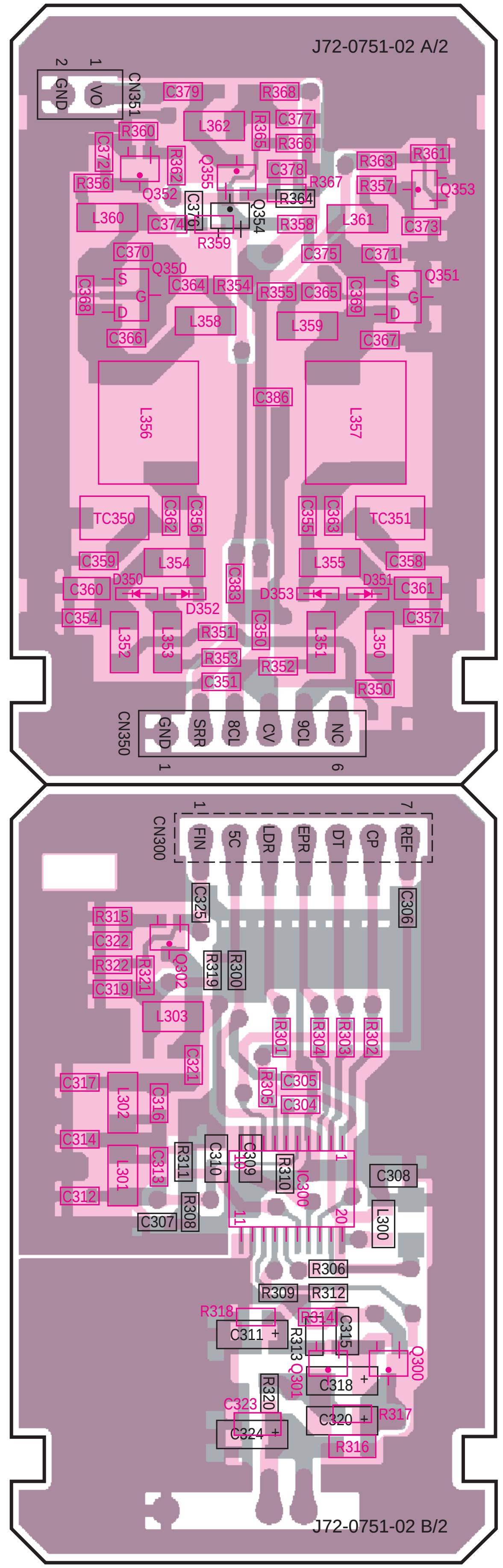
WIRING


INT SP
CN605
TX-RX UNIT B/2
X57-627*-**
TX-RX UNIT A/2
X57-627*-**
DISPLAY UNIT A/2
X54-333*-**
DISPLAY UNIT B/2
X54-333*-**
FINAL UNIT A/2
X45-363*-**
FINAL UNIT B/2
X45-363*-**
SUB UNIT
(RX VCO/PLL)
X58-480
SUB UNIT
(TX VCO/PLL)
X58-481
RX ANT
TX ANT
MAIN DC
BACKUP BATTERY
FAN
CONTROL I/O
TEST/SPKR
MIC
5V AVR
3.3V AVR
1.8V AVR
8V AVR
9V AVR
W1
W2
W3
W4
W5
W6
W7
W8
W9
W10
W11
CN600
CN601
CN602
CN603
CN604
CN606
CN501
CN502
J601
CN14
CN15
CN16
CN18
CN19
CN1
CN3
CN4
CN5
CN6
CN7
CN8

RX PLL/VCO (X58-4800-XX)
-10 : K,E -11 : K2 -12 : K3 Component side view

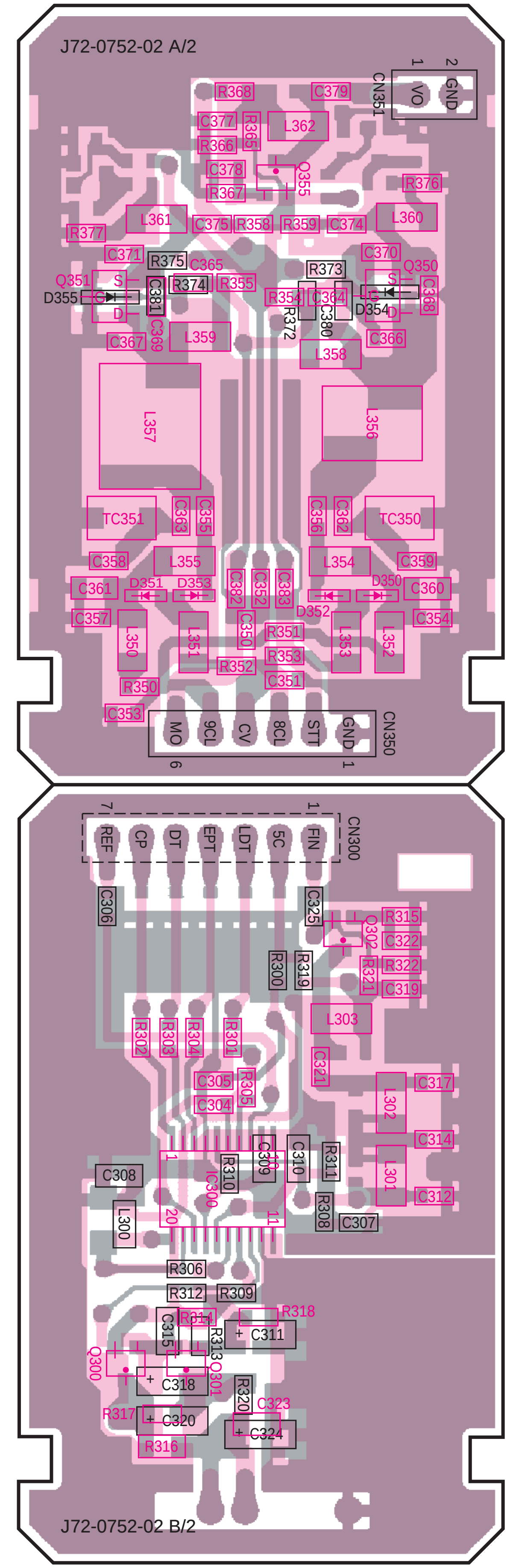


RX PLL/VCO (X58-4800-XX)
-10 : K,E -11 : K2 -12 : K3 Foil side view

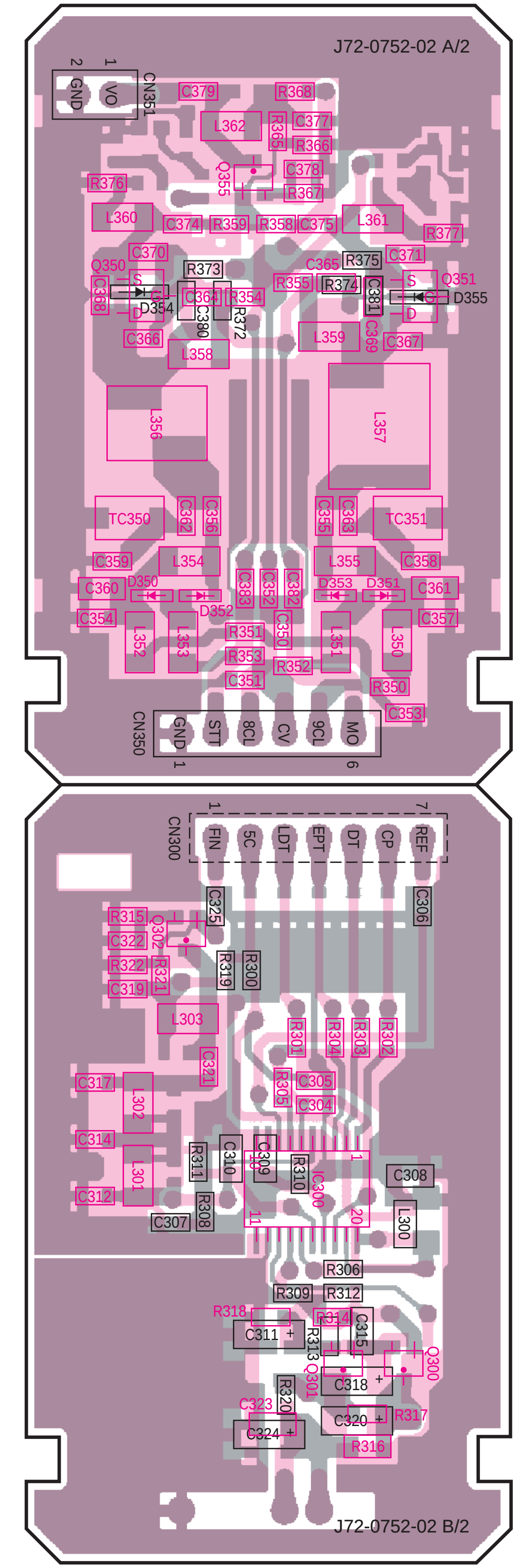


Component side Foil side

TX PLL/VCO (X58-4810-XX)
-10 : K,E -11 : K2 -12 : K3 Component side view



TX PLL/VCO (X58-4810-XX)
-10 : K,E -11 : K2 -12 : K3 Foil side view

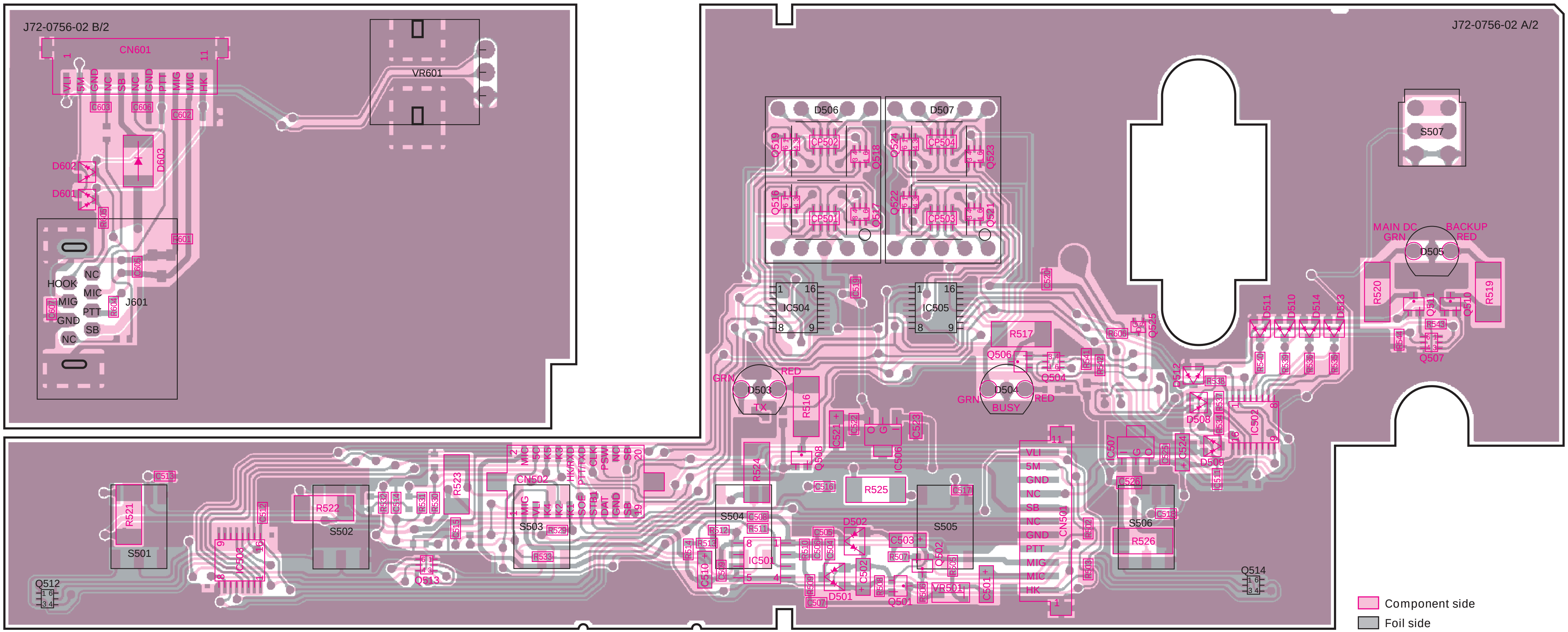


Component side Foil side

A B C D E F G H I J

TKR-850 PC BOARD VIEWS

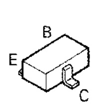
DISPLAY UNIT (X54-3330-20) Component side view



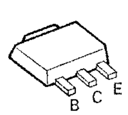
- Component side
- Foil side

DTA144EUA
DTC363EK
DTD114EK
DTD123EK
2SA1586
2SC3356
2SC4116

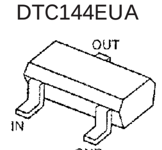
2SC4226
2SC4617
3SC5110



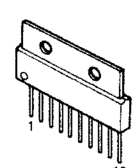
2SB1132
2SC3357



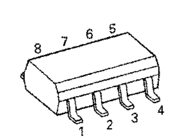
DTA114EUA
DTC114EUA
DTC144EUA



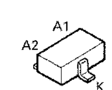
LA4422



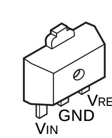
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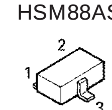
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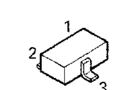
TA78L05F



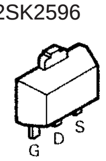
DA204U
HSM88AS



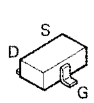
MA742



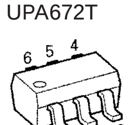
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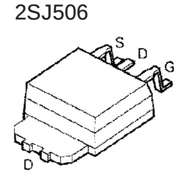
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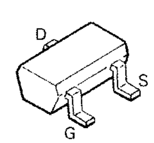
UPA672T



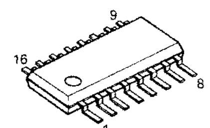
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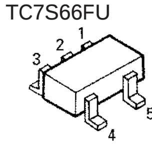
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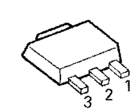
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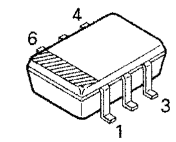
TC7S00F
TC7S04FU
TC7S66FU



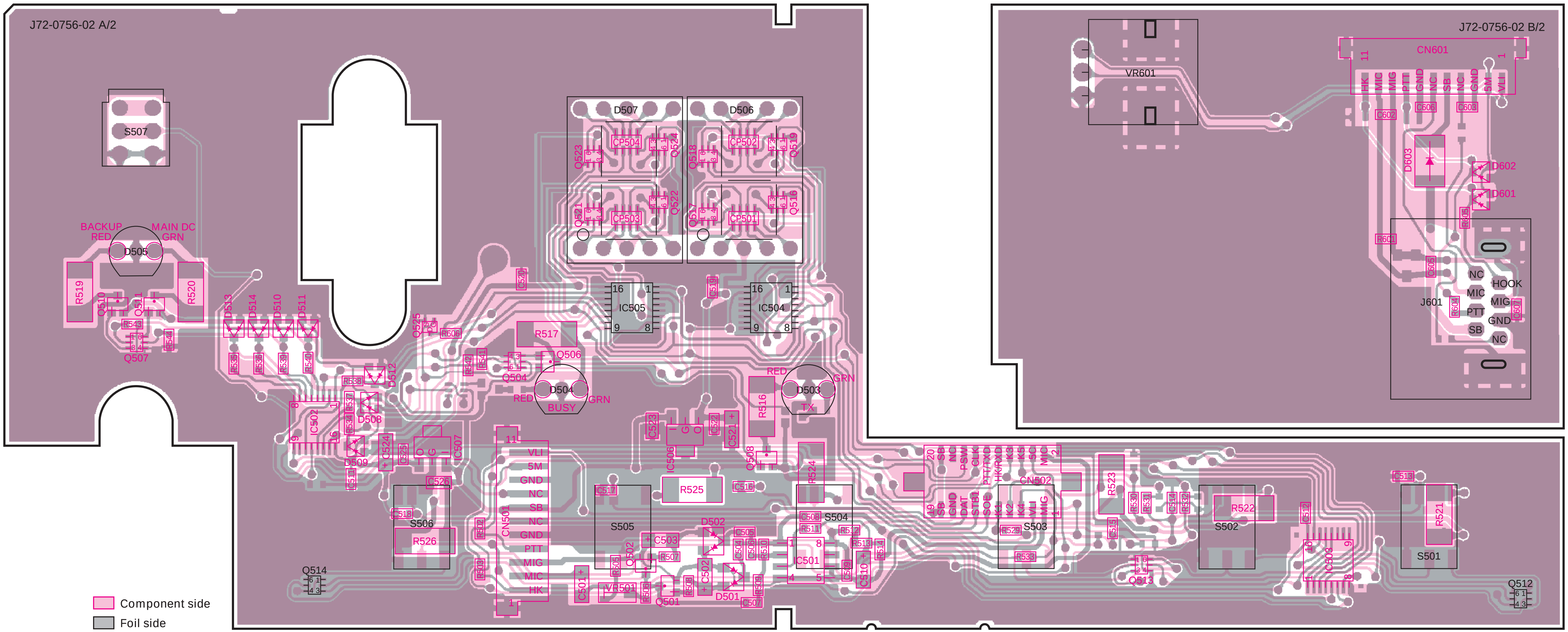
AN8009M

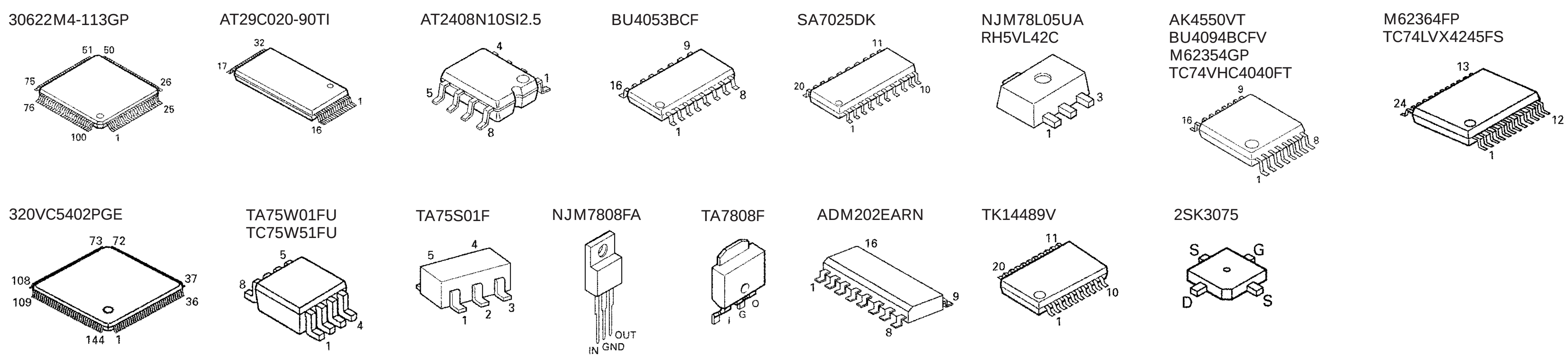


TK11050M



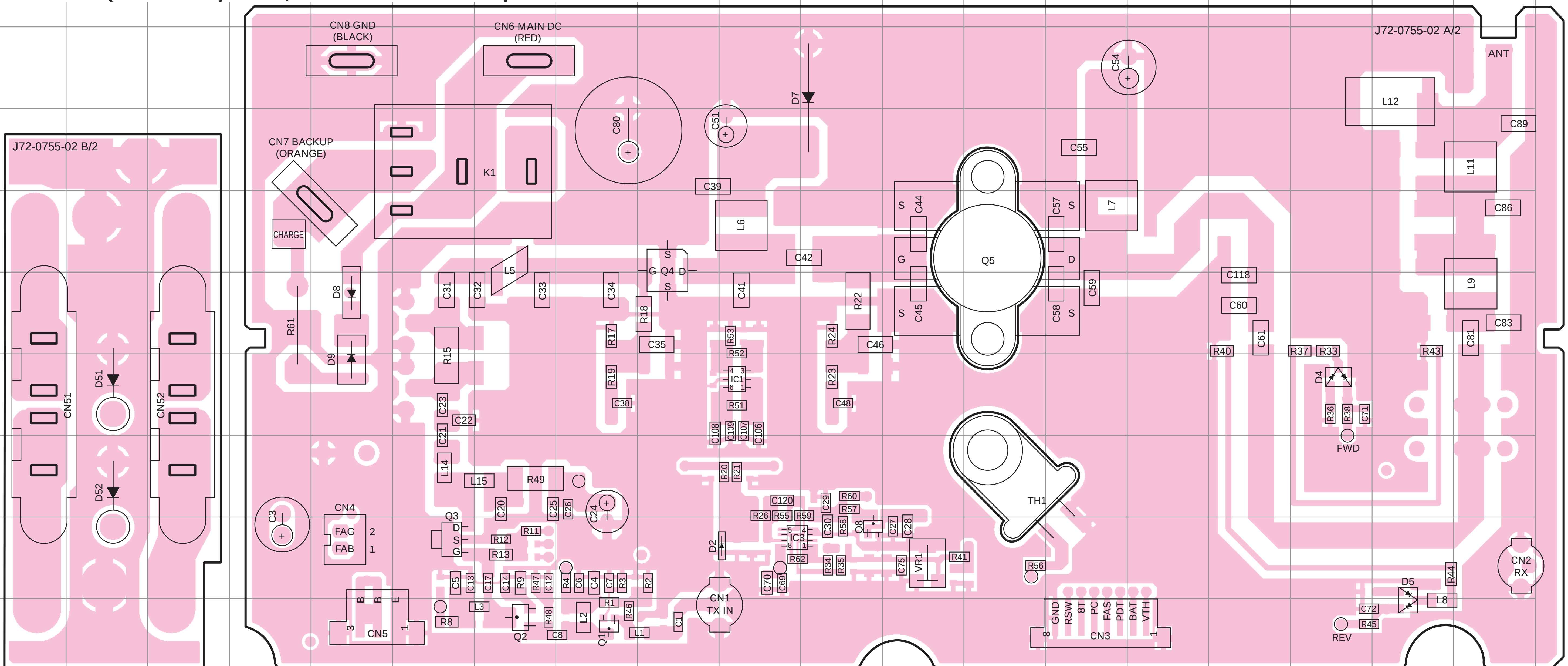
DISPLAY UNIT (X54-3330-20) Foil side view





TKR-850 PC BOARD VIEWS

FINAL UNIT (X45-3630-XX) -10 : K,E -11 : K2 -12 : K3 Component side view



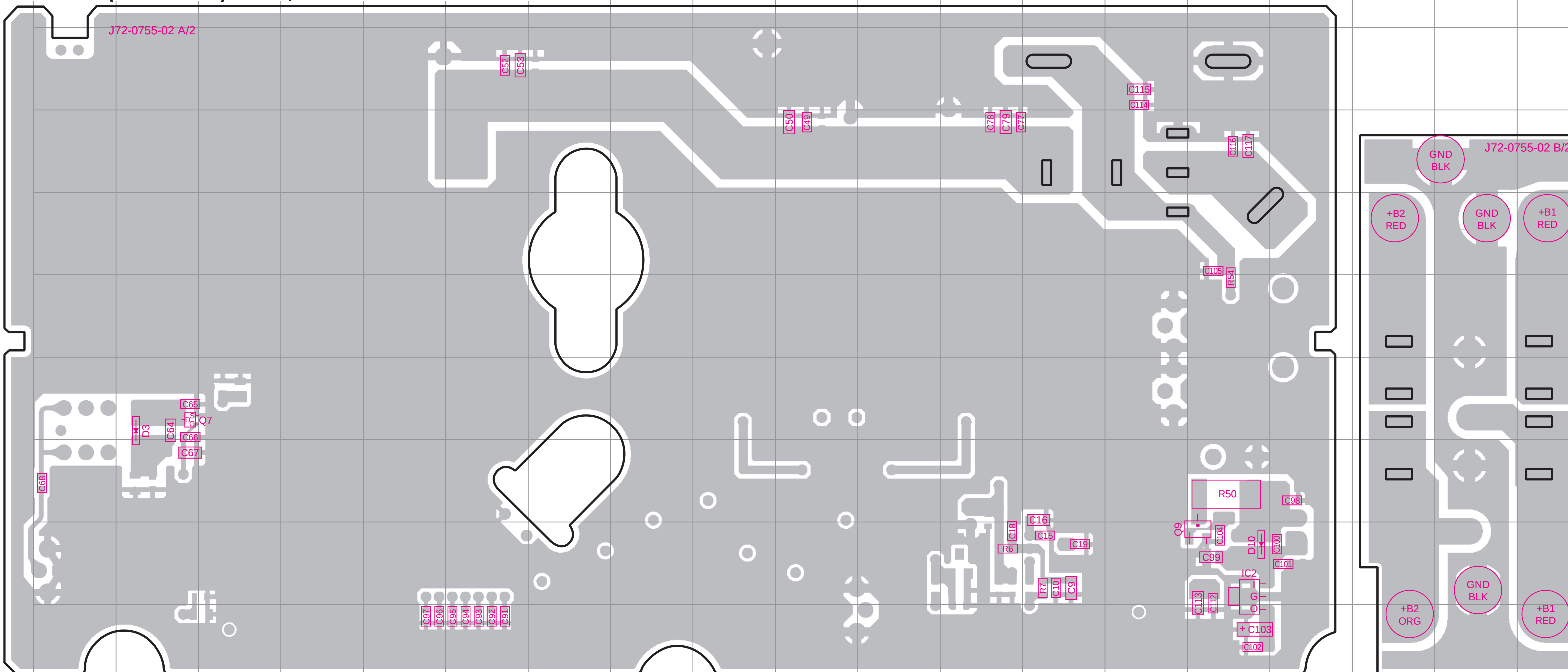
Ref No.	Address	Ref No.	Address	Ref No.	Address	Ref No.	Address
IC1	7J	Q3	9F	D2	9J	D8	6E
IC3	9J	Q4	5I	D4	7Q	D9	7E
Q1	10H	Q5	5M	D5	9R	D51	7B
Q2	10G	Q8	9K	D7	3K	D52	8B

Component side

Pattern 1
Pattern 2
Pattern 3
Pattern 4

Foil side

FINAL UNIT (X45-3630-XX) -10 : K,E -11 : K2 -12 : K3 Foil side view



Ref No.	Address	Ref No.	Address
IC2	9O	D3	7B
Q7	7B	D10	9O
Q9	9O		

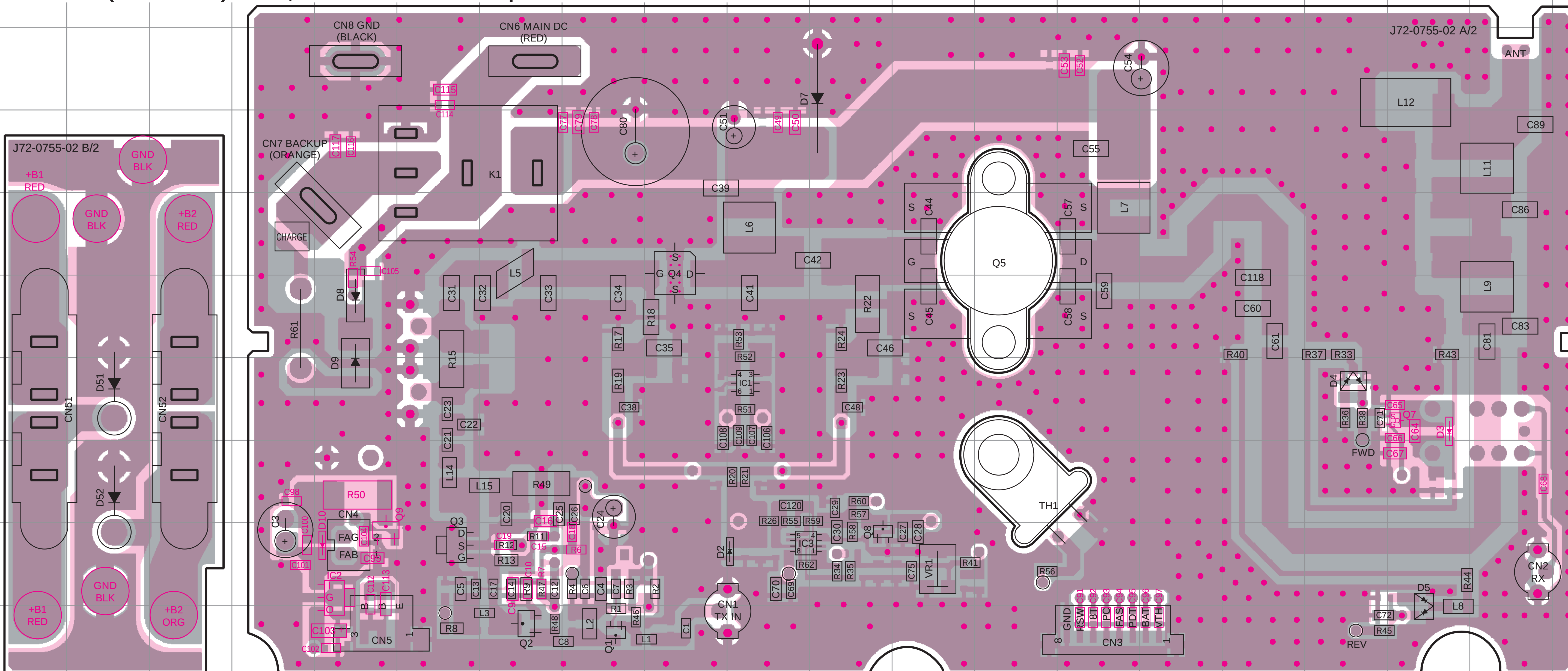
Component side

Pattern 1	
Pattern 2	
Pattern 3	
Pattern 4	

Foil side

TKR-850 PC BOARD VIEWS

FINAL UNIT (X45-3630-XX) -10 : K,E -11 : K2 -12 : K3 Component side view + Foil side

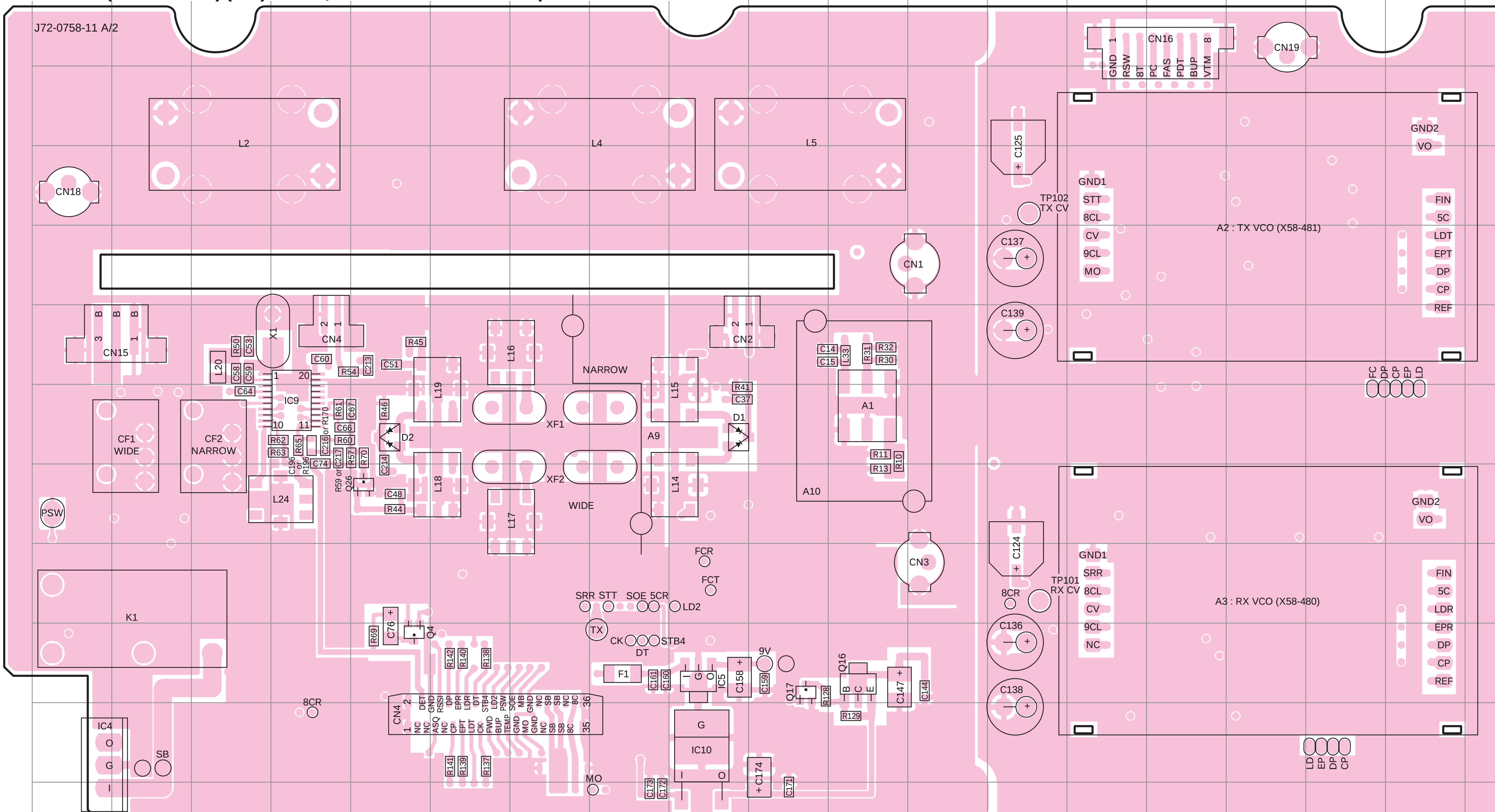


Ref No.	Address	Ref No.	Address	Ref No.	Address
IC1	7J	Q5	5M	D5	9R
IC2	9E	Q7	7R	D7	3K
IC3	9J	Q8	9K	D8	6E
Q1	10H	Q9	9E	D9	7E
Q2	10G	D2	9J	D10	9E
Q3	9F	D3	7R	D51	7B
Q4	5I	D4	7Q	D52	8B

Component side
Pattern 1
Pattern 2
Pattern 3
Pattern 4
Foil side

● Connect 1 and 4

TX-RX UNIT (X57-6270-XX) (A/2) -10 : K,E -11 : K2 -12 : K3 Component side view



Ref No.	Address	Ref No.	Address	Ref No.	Address	Ref No.	Address
IC4	11A	IC10	11I	Q17	10J	D2	7E
IC5	10I	Q4	10E	Q26	8E		
IC9	7D	Q16	10K	D1	7I		

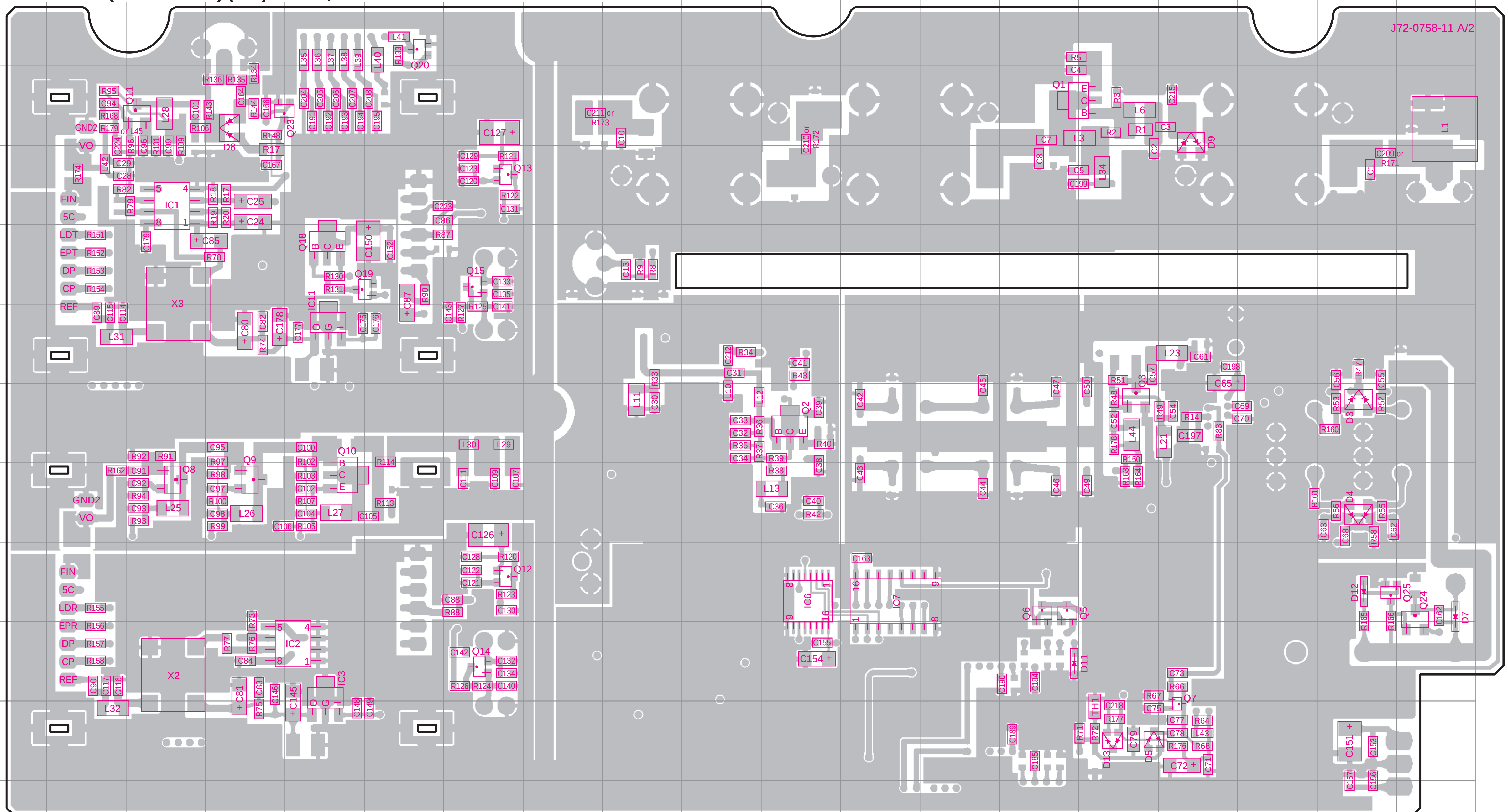
Component side

Pattern 1
Pattern 2
Pattern 3
Pattern 4

Foil side

TKR-850 PC BOARD VIEW

TX-RX UNIT (X57-6270-XX) (A/2) -10 : K,E -11 : K2 -12 : K3 Foil side view



Ref No.	Address	Ref No.	Address	Ref No.	Address	Ref No.	Address	Ref No.	Address	Ref No.	Address	Ref No.	Address
IC1	4C	IC11	6E	Q6	9N	Q11	3C	Q18	5E	Q25	9R	D8	3D
IC2	10E	Q1	3N	Q7	11P	Q12	9G	Q19	5F	D3	7R	D9	3P
IC3	10E	Q2	7K	Q8	8C	Q13	4G	Q20	2F	D4	8R	D11	10N
IC6	9K	Q3	7O	Q9	8D	Q14	10G	Q23	3E	D5	11O	D12	9R
IC7	9L	Q5	9N	Q10	8E	Q15	5G	Q24	9S	D7	9S	D13	11O

Component side
Pattern 1
Pattern 2
Pattern 3
Pattern 4
Foil side

PC BOARD VIEW TKR-850

TX-RX UNIT (X57-6270-XX) (A/2) -10 : K,E -11 : K2 -12 : K3 Component side view + Foil side



Ref No.	Address	Ref No.	Address	Ref No.	Address	Ref No.	Address	Ref No.	Address	Ref No.	Address	Ref No.	Address	Ref No.	Address	Ref No.	Address
IC1	4Q	IC6	9I	Q1	3F	Q6	9F	Q11	3Q	Q16	10K	Q23	3O	D2	7E	D8	3P
IC2	10O	IC7	9H	Q2	7I	Q7	11D	Q12	9M	Q17	10J	Q24	9A	D3	7B	D9	3D
IC3	10O	IC9	7D	Q3	7E	Q8	8Q	Q13	4M	Q18	5O	Q25	9B	D4	8B	D11	10F
IC4	11A	IC10	11I	Q4	10E	Q9	8P	Q14	10M	Q19	5O	Q26	8E	D5	11E	D12	9B
IC5	10I	IC11	6O	Q5	9F	Q10	8O	Q15	5M	Q20	2N	D1	7I	D7	9A	D13	11E

Component side

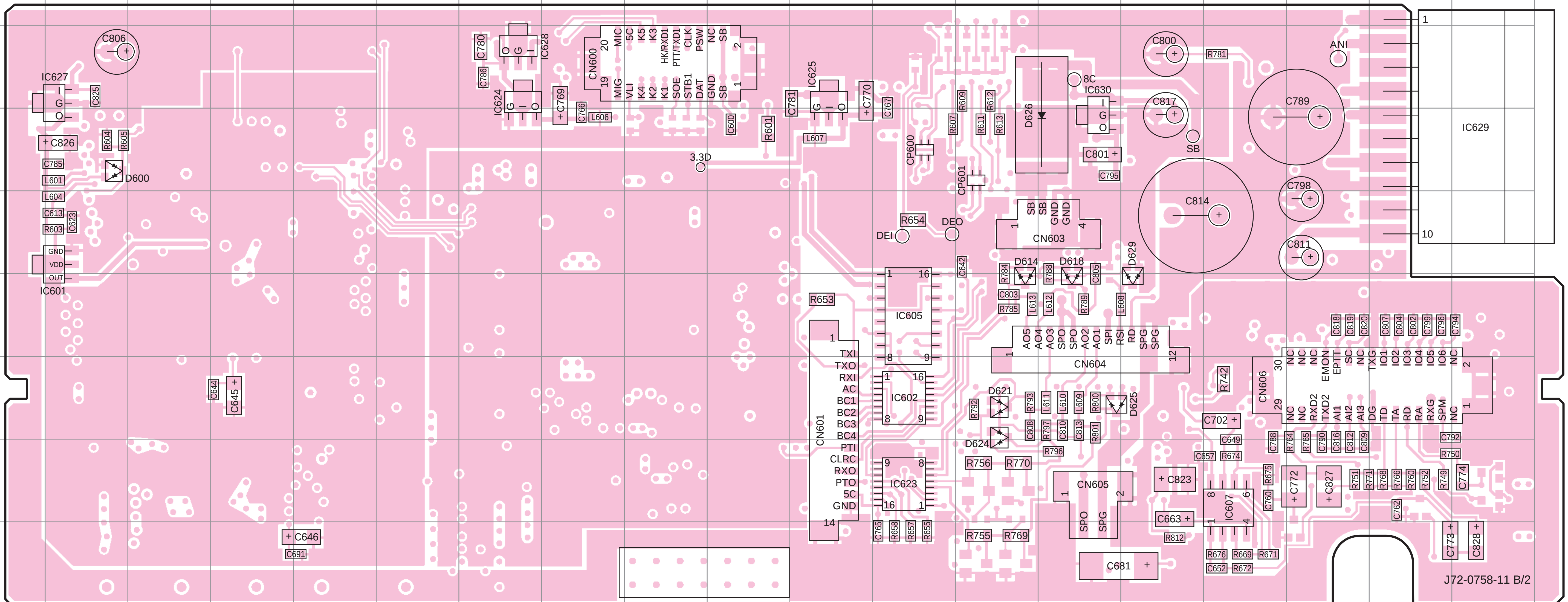
Pattern 1
Pattern 2
Pattern 3
Pattern 4

Foil side

● Connect 1 and 4

TKR-850 PC BOARD VIEW

TX-RX UNIT (X57-6270-XX) (B/2) -10 : K,E -11 : K2 -12 : K3 Component side view



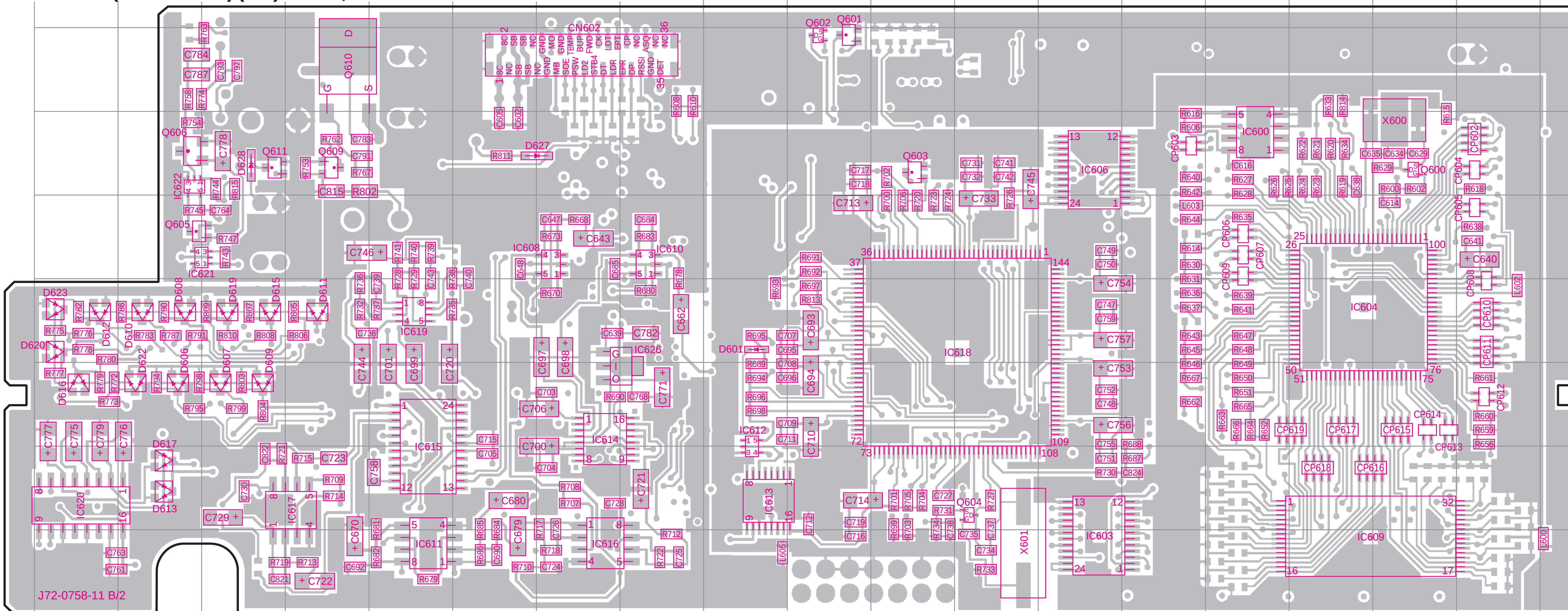
Ref No.	Address	Ref No.	Address	Ref No.	Address	Ref No.	Address
IC601	5B	IC624	3G	IC630	4N	D624	7M
IC602	7L	IC625	3K	D600	4B	D625	7N
IC605	6L	IC627	3B	D614	6M	D626	4N
IC607	8P	IC628	3G	D618	6N	D629	6O
IC623	8L	IC629	4S	D621	7M		

Component side

Pattern 1
Pattern 2
Pattern 3
Pattern 4

Foil side

TX-RX UNIT (X57-6270-XX) (B/2) -10 : K,E -11 : K2 -12 : K3 Foil side view

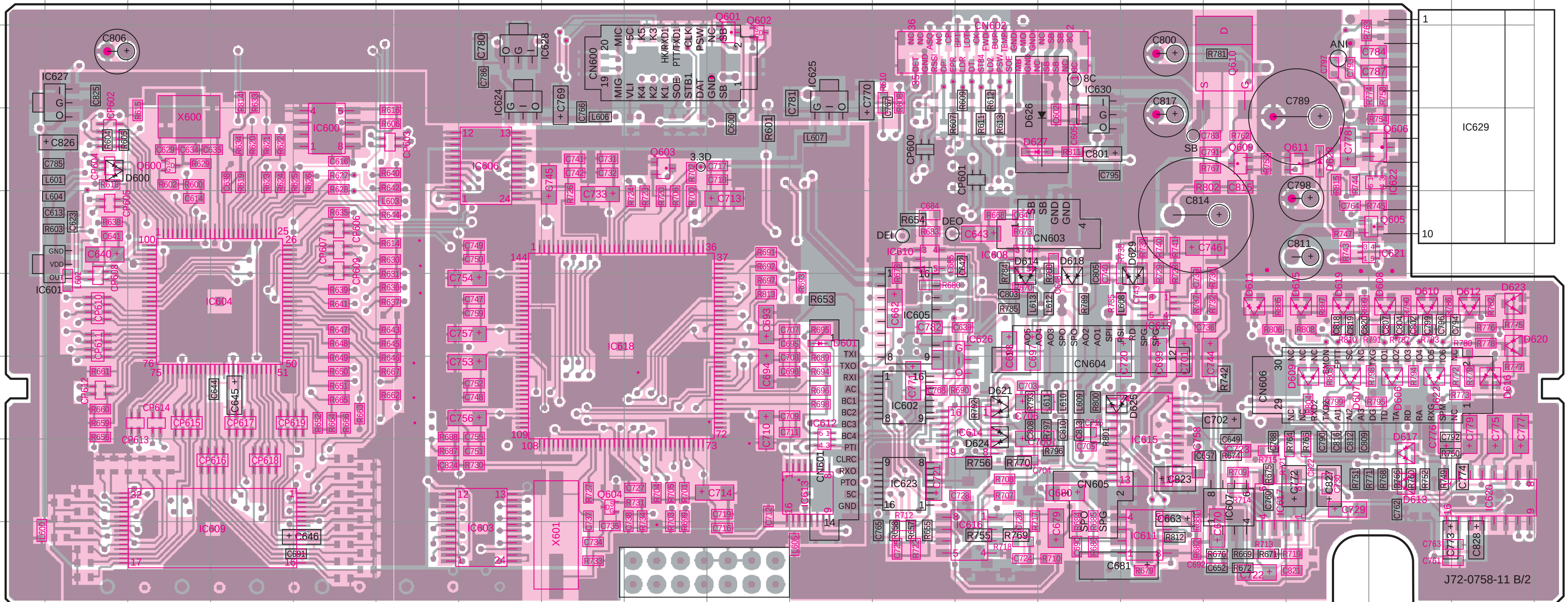


Ref No.	Address	Ref No.	Address	Ref No.	Address	Ref No.	Address	Ref No.	Address	Ref No.	Address	Ref No.	Address
IC600	4O	IC611	9E	IC618	6L	Q601	3J	Q610	3D	D610	6B	D619	6C
IC603	9M	IC612	7I	IC619	6E	Q602	3J	Q611	4C	D611	6D	D620	6A
IC604	6P	IC613	8I	IC620	8A	Q603	4K	D601	6I	D612	6A	D622	7B
IC606	4M	IC614	7G	IC621	5B	Q604	8L	D606	7B	D613	8B	D623	6A
IC608	5G	IC615	7E	IC622	4B	Q605	5B	D607	7C	D615	6C	D627	4G
IC609	9P	IC616	9G	IC626	7H	Q606	4B	D608	6B	D616	7A	D628	4C
IC610	5H	IC617	8D	Q600	4Q	Q609	4D	D609	7C	D617	8B		

Component side
Pattern 1
Pattern 2
Pattern 3
Pattern 4
Foil side

TKR-850 PC BOARD VIEW

TX-RX UNIT (X57-6270-XX) (B/2) -10 : K,E -11 : K2 -12 : K3 Component side view + Foil side


Ref No.	Address	Ref No.	Address	Ref No.	Address	Ref No.	Address	Ref No.	Address	Ref No.	Address	Ref No.	Address	Ref No.	Address	Ref No.	Address	Ref No.	Address
IC600	4E	IC607	8P	IC614	7M	IC621	5R	IC628	3G	Q604	8H	D601	6K	D612	6S	D619	6Q	D626	4N
IC601	5B	IC608	5M	IC615	7O	IC622	4R	IC629	4S	Q605	5R	D606	7R	D613	8R	D620	6S	D627	4M
IC602	7L	IC609	9D	IC616	9M	IC623	8L	IC630	4N	Q606	4R	D607	7Q	D614	6M	D621	7M	D628	4Q
IC603	9G	IC610	5L	IC617	8P	IC624	3G	Q600	4C	Q609	4P	D608	6R	D615	6Q	D622	7R	D629	6O
IC604	6D	IC611	9O	IC618	6H	IC625	3K	Q601	3J	Q610	3P	D609	7Q	D616	7S	D623	6S		
IC605	6L	IC612	7K	IC619	6O	IC626	6M	Q602	3J	Q611	4Q	D610	6R	D617	8R	D624	7M		
IC606	4G	IC613	8K	IC620	8S	IC627	3B	Q603	4I	D600	4B	D611	6P	D618	6N	D625	7N		

Component side
Pattern 1
Pattern 2
Pattern 3
Pattern 4
Foil side

● Connect 1 and 4

Note : Components marked with a dot (·) are parts of pattern 1.



X57-6270-XX

		A2	A3	C1	C2	C3	C7	C8	C10	C14	C15	C28	C29	C91	C94	C95	C100	C209	C210	C211	C215	C223	C224	L2	L3	L4	L5	L6	L26	L27	L28	L29	L30	L42	L45	R1	R65	R94	R168	R171	R172	R173	R175	R179
-10	K,E	X58-4810-10	X58-4800-10	NO	NO	18p	5p	NO	NO	6p	6p	2p	2p	4p	3p	4p	5p	10p	10p	10p	NO	100p	NO	L79-1771-05	18n	L79-1771-05	L79-1771-05	NO	15n	22n	18n	18n	18n	6.8n	NO	0	4.7k	100	0	NO	NO	NO	0	0
-11	K2	X58-4810-11	X58-4800-11	NO	4p	7p	5p	NO	NO	6p	6p	2p	2p	4p	3p	6p	5p	10p	10p	100p	NO	NO	NO	L79-1772-05	15n	L79-1772-05	L79-1772-05	10n	15n	18n	18n	18n	18n	6.8n	NO	NO	4.7k	82	0	NO	NO	NO	0	0
-12	K3	X58-4810-12	X58-4800-12	3p	1p	6p	7p	6p	4p	7p	7p	8p	11p	5p	4p	4p	6p	NO	NO	NO	5p	NO	3p	L79-1782-05	22n	L79-1782-05	L79-1782-05	12n	22n	22n	22n	22n	22n	18n	18n	NO	3.9k	100	270	0	0	0	390	NO

D1-4,8 :DAN235K
D5 :MA742
D7 :1SS355
D9 :HSM88AS
D11 :02DZ5.1(Y)
D12 :02DZ18(X,Y)
Q1,2,10 :2SC3357
Q3,11 :2SC3356(R24)
Q4,6 :DTC144EUA
Q5 :DTA144EUA
Q7 :2SC4617(S)
Q8,9 :2SC3356
Q12-15 :2SC4116(GR)
Q16 :2SB1132(Q,R)
Q17,19,20,23,25,26 :DTC114EUA
Q18 :2SB1386(R)
Q24 :DTD114EK
IC1,2 :NJM4558E
IC3,11 :NJM78L05UA
IC4 :NJM7808FA
IC5 :AN8009M
IC6 :M62354GP
IC7 :BU4094BCF
IC9 :TK14489V
IC10 :TA7808F

A2 X58-4810-XX (TX VCO/PLL)

		Q350	Q351	C312	C314	C317	C324	C350	C352	C353	C354	C355	C356	C357	C358	C359	C360	C361	C362	C363	C364	C365	C366	C367	C368	C369	C370	C371	C374	C375	C380	C381	D350	D351	D352	D353	D354	D355
-10	K,E	2SK508NV(K52)	NO	6p	12p	6p	0.22u/35V	470p	100p	NO	470p	NO	8p	NO	NO	1.5p	0.1u	NO	12p	NO	470p	NO	7p	NO	7p	NO	7p	NO	0.5p	NO	0.5p	NO	1SV282	NO	1SV282	NO	1SV214	NO
-11	K2	2SK508NV(K52)	NO	5p	10p	5p	0.22u/35V	470p	NO	NO	470p	NO	7p	NO	NO	1.5p	0.1u	NO	12p	NO	470p	NO	7p	NO	7p	NO	7p	NO	0.5p	NO	0.5p	NO	1SV282	NO	1SV282	NO	1SV214	NO
-12	K3	NO	2SK508NV(K52)	7p	12p	7p	0.33u/35V	NO	100p	470p	NO	10p	NO	470p	3p	NO	NO	0.1u	NO	18p	NO	470p	NO	7p	NO	8p	NO	8p	NO	0.5p	NO	0.5p	NO	1SV282	NO	1SV282	NO	1SV214

		L301	L302	L303	L350	L351	L352	L353	L354	L355	L356	L357	L358	L359	L360	L361	L362	R350	R351	R352	R353	R354	R355	R358	R359	R372	R373	R374	R375	R376	R377	TC350	TC351
-10	K,E	15n	15n	22n	NO	NO	1u	1u	1u	NO	L34-4645-05	NO	1u	NO	1u	NO	33n	NO	0	NO	0	33	NO	NO	47	100k	100k	NO	NO	150	NO	C05-0396-05	NO
-11	K2	15n	15n	18n	NO	NO	1u	1u	1u	NO	L34-4605-05	NO	1u	NO	1u	NO	22n	NO	0	NO	0	33	NO	NO	47	100k	100k	NO	NO	150	NO	C05-0396-05	NO
-12	K3	18n	18n	27n	1u	1u	NO	NO	NO	1u	NO	L34-4607-05	NO	1.5u	NO	1.5u	33n	0	NO	0	NO	NO	33	47	NO	NO	NO	100k	100k	NO	180	NO	C05-0396-05

D350-353 :1SV282
D354,355 :1SV214
Q300,301 :2SC4116(GR)
Q302,355 :2SC4226(R24)
Q350,351 :2SK508NV(K52)
IC300 :SA7025DK


A3 X58-4800-XX (RX VCO/PLL)

		C312	C314	C317	C355	C356	C363	C386	L301	L302	L303	L356	L357	R309	R312	R356	R357
-10	K,E	7p	12p	7p	5p	6p	15p	100p	18n	18n	22n	L34-4608-05	L34-4608-05	330	330	220	180
-11	K2	6p	15p	6p	5p	6p	18p	22p	15n	15n	18n	L34-4607-05	L34-4607-05	390	390	180	150
-12	K3	8p	18p	8p	6p	7p	15p	100p	18n	18n	27n	L34-4609-05	L34-4609-05	330	330	220	180

D350-353 :1SV282
Q300,301 :2SC4116(GR)
Q302,355 :2SC4226(R24)
Q350,351 :2SK508NV(K52)
Q352,353 :2SC4116(Y)
Q354 :DTC114EUA
IC300 :SA7025DK

TKR-850 CIRCUIT DIAGRAM

Note : Components marked with a dot (•) are parts of pattern 1.

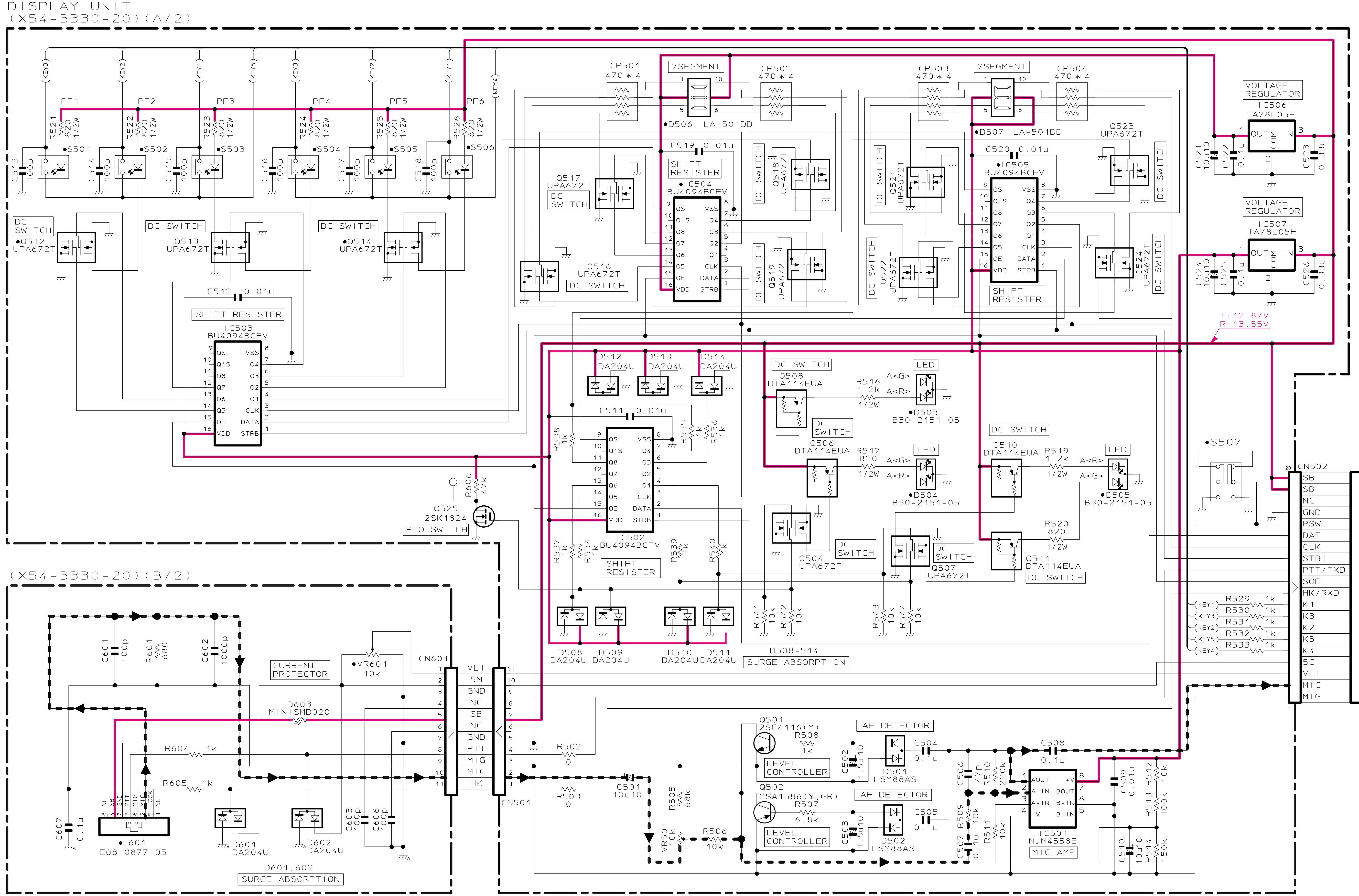


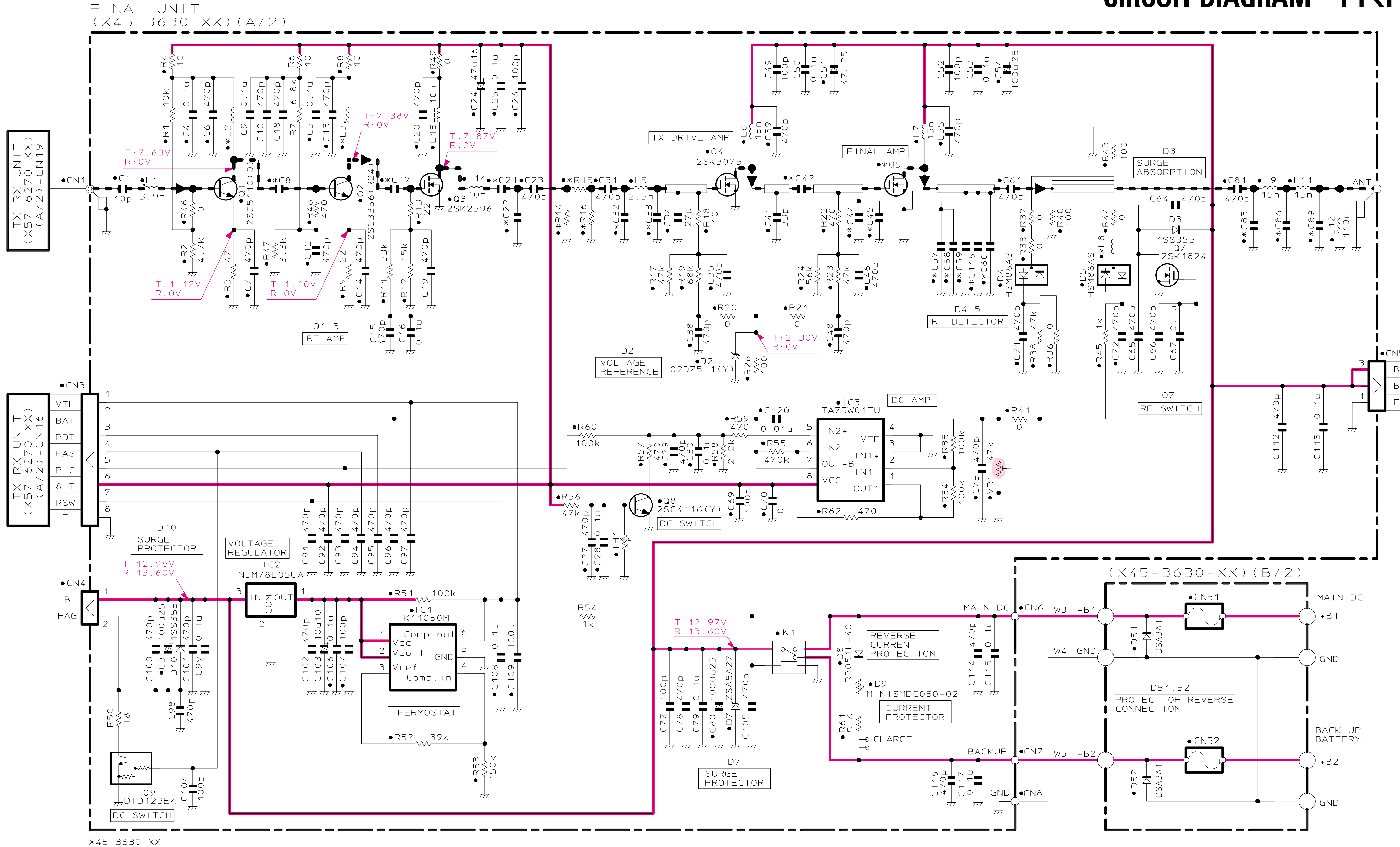
D600,606-625,629	:DA204U	Q600,602,604	:2SK1824	IC600	:AT2408N10SI2.5	IC604	:30622M4-113GP	IC609	:AT29C020-90TI	IC615	:M62364FP	IC620	:ADM202EARN
D601	:MA2S111	Q601,603,605,609,611	:DTC114EUA	IC601	:RH5VL42C	IC605	:BU4053BCF	IC612	:TC7S04FU	IC618	:320VC5402PGE	IC621	:TC7S00FU
D626	:MINISMDE190	Q606	:DTC363EK	IC602,623	:BU4094BCFV	IC607,611,616,617	:NJM4558E	IC613	:TC74VHC4040FT	IC619	:TC75W51FU	IC622	:TC7S66FU
D627,628	:1SS355	Q610	:2SJ506(S)	IC603,606	:TC74LVX4245FS	IC608,610	:TA75S01F	IC614	:AK4550VT			IC624	:XC62FP1802P

IC625,626	:XC62FP3302P
IC627,628,630	:TA78L05F

CIRCUIT DIAGRAM TKR-850

Note : Components marked with a dot (·) are parts of pattern 1.





D51,52 :DSA3A1

X45-3630-XX

		C8	C17	C21	C22	C32	C33	C42	C44	C45	C57	C58	C59	C60	C83	C86	C89	C118	R14	R15	R16	L2	L3	L8	Q5
-10	K,E	3p	39p	12p	9p	12p	27p	18p	36p	36p	33p	33p	22p	NO	6p	10p	5p	7p	NO	0	NO	18n	4.7n	39n	2SK3478-22
-11	K2	3p	27p	12p	9p	8p	18p	15p	33p	33p	33p	33p	18p	5p	5p	10p	5p	NO	NO	0	NO	18n	4.7n	39n	2SK3478-21
-12	K3	10p	56p	22p	12p	18p	27p	33p	39p	39p	39p	39p	27p	NO	7p	12p	6p	10p	1k	5.6	1k	27n	8.2n	68n	2SK3478-22

D601,602 :DA204U
D603 :MINISMD020

D501,502 :HSM88AS
D503-505 :B30-2151-05
D506,507 :LA-501DD
D508-614 :DA204U

Q501 :2SC4116(Y)
Q502 :2SA1586(Y,GR)
Q504,507,512-514 516-519,521-524 :UPA672T

Q506,508 510,511 :DTA114EUA
Q525 :2SK1824

IC501 :NJM4558E
IC502-505 :BU4094BCFV
IC506,507 :TA78L05F

D2 :02DZ5.1(Y)
D3,10 :1SS355
D4,5 :HSM88AS
D7 :ZSA5A27
D8 :RB051L-40
D9 :MINISMDC050-02

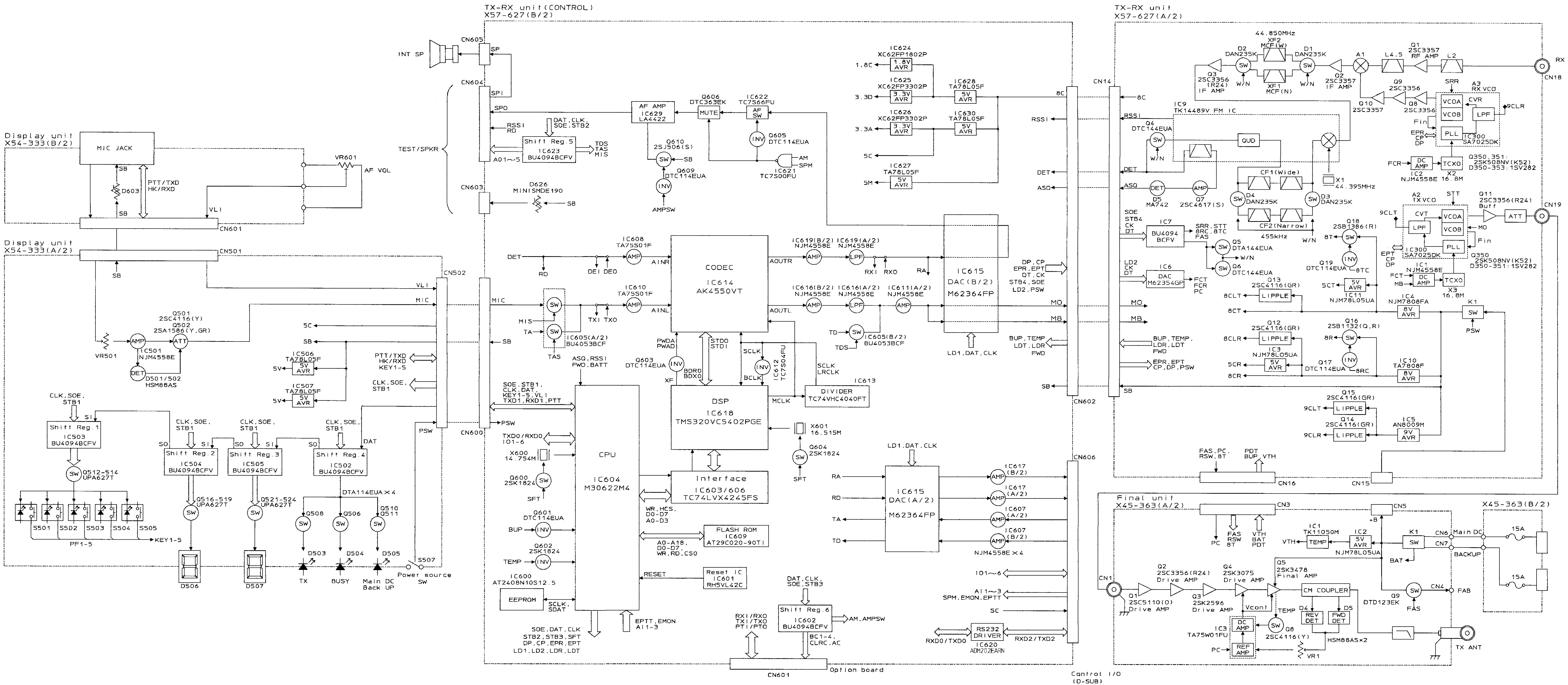
Q1 :2SC5110(O)
Q2 :2SC3356(R24)
Q3 :2SK2596
Q4 :2SK3075
Q5 :*
Q7 :2SK1824

Q8 :2SC4116(Y)
Q9 :DTD123EK

IC1 :TK11050M
IC2 :NJM78L05UA
IC3 :TA75W01FU

TKR-850 TKR-850

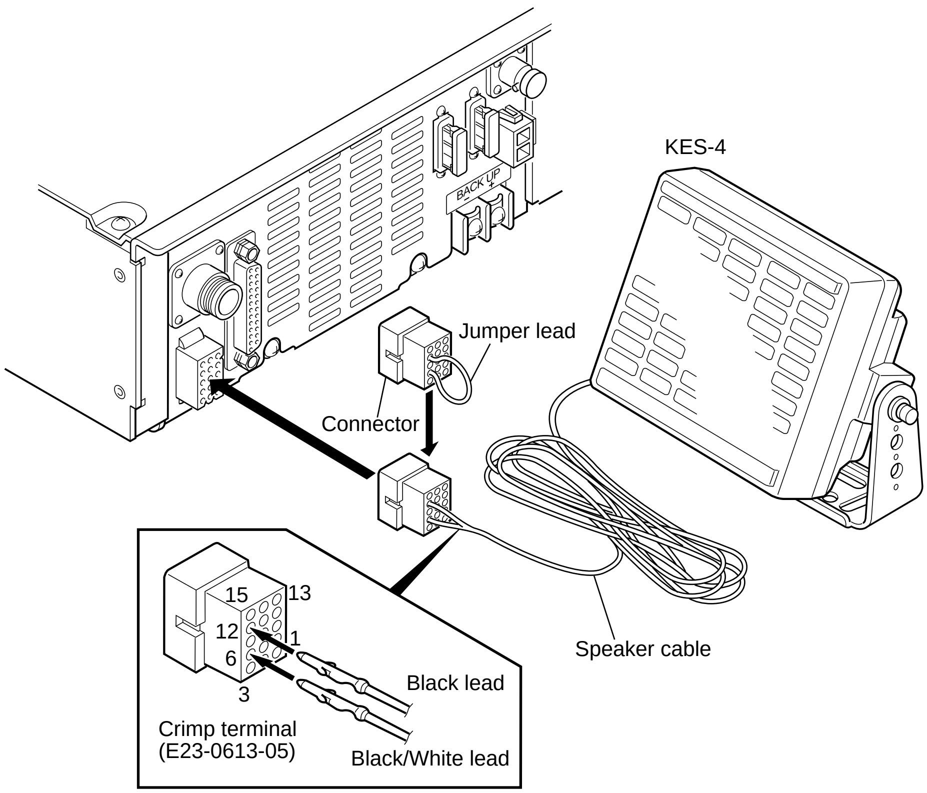
BLOCK DIAGRAM



KES-4 (EXTERNAL SPEAKER)

When Using an External Speaker

1. Make sure the unit's power is tuned off.
2. When using the external speaker, remove the jumper lead from the connector, and attach the speaker cable.
3. When not using the external speaker, replace the jumper lead and insert the connector into the speaker jack (pin9 and 12).



Specifications

Speaker size	120mm
Maximum input power	20W
Impedance	4Ω
Frequency response	100 to 5000Hz
Dimensions (W x H x D)	127 x 127 x 65 mm
projection not included	5 x 5 x 2-9/16 inch
Weight	780g / 1.72 lbs

SPECIFICATIONS (K,K2,K3 TYPE)

GENERAL

Frequency Range	K : 450 to 480MHz K2 : 480 to 512MHz K3 : 400 to 430MHz
Number of Channels	16 channel
Channel Spacing	Wide : 25kHz Narrow : 12.5kHz (PLL channel stepping 5kHz/6.25kHz)
Operating Voltage	13.6V DC±15%
Current Drain	
Standby	0.8A
Standby w/power save	0.3A (Operating mode DC-IN : Backup, FAN : Temp, SAVE : ON, DISP : OFF)
Receive	1.2A
Transmit/Receive	Less than 13A
Duty Cycle	
Receive	100%
Transmit	100% (100% @25W)
Frequency Stability	Less than ±0.00015% –30°C to +60°C (–22°F to +140°F)
Antenna Impedance	50Ω
Operating Temperature Range	–30°C to +60°C (–22°F to +140°F)
Dimensions	483 (19) W x 88 (3-1/2) H x 340 (13-1/3) D mm (inch)
Weight	9.7kg (21.4 lbs.)

RECEIVER (Measured by TIA/EIA-603)

Sensitivity	
12dB SINAD	0.35μV
20dB Quieting	0.45μV
Selectivity	Wide : 83dB (±25kHz) Narrow : 75dB (12.5kHz)
Intermodulation	Wide : 78dB (±25kHz/±50kHz) Narrow : 75dB (±12.5kHz/±25kHz)
Hum and Noise	Wide : 50dB Narrow : 45dB
Spurious & Image Rejection	90dB
Audio Output (Ext. Speaker)	4W at 4Ω less than 5% distortion
Audio Distortion (Ext. Speaker)	Less than 2.5% at 1000Hz
Band Spread	K,K2 : 5MHz K3 : 3MHz

TRANSMITTER (Measured by TIA/EIA-603)

RF Power Output	40W adjustable to 25W (100% duty @25W)
Type of Emission	Wide : 16K0F3E Narrow : 11K0F3E
Spurious Response	Harmonics : 80dB Others : 75dB
FM Hum and Noise	Wide : 50dB Narrow : 45dB
Audio Distortion	Less than 3% at 1000Hz
Microphone Impedance	600Ω
Band Spread	K : 30MHz K2 : 32MHz K3 : 30MHz

SPECIFICATIONS (E TYPE)

GENERAL

Frequency Range	440 to 470MHz
Number of Channels	16 channel
Channel Spacing	Wide : 25kHz Narrow : 12.5kHz (PLL channel stepping 5kHz/6.25kHz)
Operating Voltage	13.2V DC
Current Drain	
Standby	0.8A
Standby w/power save	0.3A (Operating mode DC-IN : Backup, FAN : Temp, SAVE : ON, DISP : OFF)
Receive	1.2A
Transmit/Receive	Less than 13A
Duty Cycle	Receive : 100% Transmit : 100% (100% @25W)
Frequency Stability	Less than ±0.00015% –30°C to +60°C
Antenna Impedance	50Ω
Operating Temperature Range	–30°C to +60°C
Dimensions	483 W x 88 H x 340 D mm
Weight	9.7kg

RECEIVER (Measured by ETS 300 086)

Sensitivity	0.45µV
Adjucent Channel Selectivity	83dB (±25kHz) 75dB (±12.5kHz)
Intermodulation	72dB
Spurious & Image Rejection	90dB
Audio Output (Ext. Speaker)	4W at 4Ω less than 5% distortion
Audio Distortion (Ext. Speaker)	Less than 2.5% at 1000Hz
Band Spread	5MHz

TRANSMITTER (Measured by ETS 300 086)

RF Power Output	40W adjustable to 25W (100% duty @25W)
Modulation Limiting	±5kHz at ±25kHz ±2.5kHz at ±12.5kHz
Spurious Emission	–36dBm ≤ 1GHz –30dBm > 1GHz
FM Noise (EIA)	25kHz : 50dB 12.5kHz : 45dB
Modulation Distortion	Less than 3% at 1000Hz
Microphone Impedance	600Ω
Band Spread	30MHz

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